OLOGY DEPARTMENT

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DETROIT

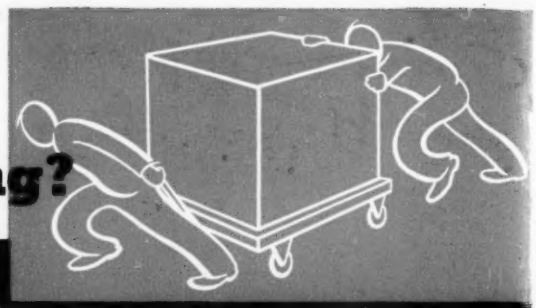
Flow

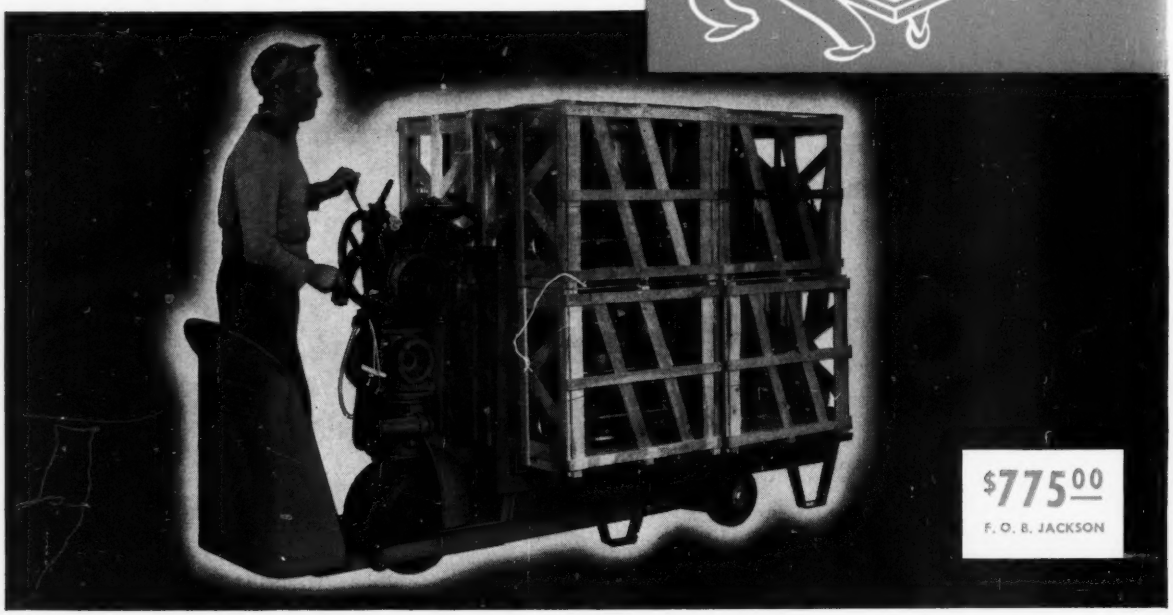
HE MAGAZINE WHICH INTEGRATES MATERIAL HANDLING EQUIPMENT INTO THE FLOW OF PRODUCTION

EBRUARY
1947

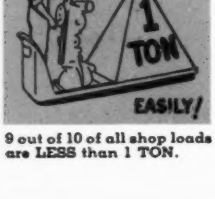
SEE
e new "WHERE TO BUY IT LOCALLY" SECTION

Can You Afford the High Cost of Push-and-Pull Hauling?





Users get 8 hours of continuous operation per gallon of gas.



Truck-Man turns in its own length!

9 out of 10 of all shop loads are LESS than 1 TON.

Thousands Have Switched to truck-man for Low-Cost Hauling

HERE'S HOW TRUCK-MAN SAVES YOU TIME AND MONEY:

- Truck-man lifts and hustles skidded loads up to 2000 lbs.—without starting or dropping shocks—safely, easily, quickly . . .
- Turns in 360°—snakes into holes its own length—increases usable floor space . . .
- Grouped controls speed and simplify operation—anyone can operate without fatigue . . .
- Speeds briskly on straightaways—creeps in narrow aisles and close squeezes . . .
- Drives on big DUAL pneumatic-tired wheels for traction and easy riding. Heavy solids carry the load . . .
- Stands the gaff—tireless, day in, day out! Maintenance and running costs are negligible. TRUCK-MAN is ECONOMICAL TO OWN, EASY TO BUY!

IF TIME AND MONEY MEAN ANYTHING TO YOU, get the FACTS on TRUCK-MAN. *Write now for new Model D folder.*

Sixty-five Truck-Man distributors in principal centers provide standard service.

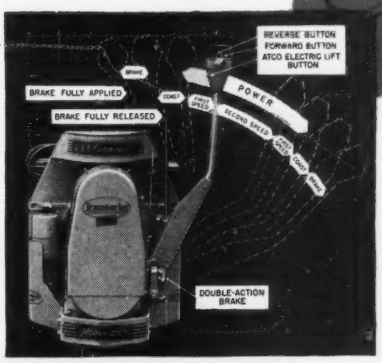
truck-man INC. • 1418 West Ganson • Jackson, Mich.

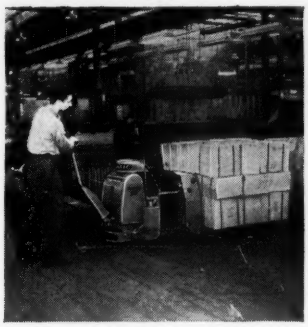
Announcing The New 1947 Transporter *with* ATCO ELECTRIC LIFT

Proved by exhaustive tests to be the fastest and easiest operating motorized hand truck ever developed—the 1947 TRANSPORTER is the first motorized hand truck with electric-lift so efficient it uses a standard 11-plate battery—which makes it the lowest operating cost electric-lift hand truck you can buy.

"Automatic" engineers through intensive research have developed an electric-lift motor and hydraulic pump, which uses less current than the reserve left in the famous TRANSPORTER standard battery at the end of a full day's operation. Therefore, the TRANSPORTER still provides maximum power for a full day's hauling and yet uses only a light socket for charging battery.

A simple pressure of the forefinger on the new ATCO ELECTRIC LIFT BUTTON raises the loaded skid or pallet to moving height in SECONDS! In a normal day's operation, less than 10% of battery capacity is used to lift to maximum height—and since the lift is not always raised more than half the full height in actual work, the current consumption will be less.





REVERSE BUTTON and guide handle eases Transporter below skid or pallet, and load is ready to be raised to moving level. Requires no skill, no muscle work—just thumb pressure.

FOREFINGER PRESSES the ATCO Electric Lift, and your material is raised, ready to move. Human energy expenditure: practically nothing.

FORWARD BUTTON starts the load—4000 to 6000 pounds of materials glide along at safe walking speed. You deposit it with the same easy "touch-of-the-fingers" control.

Muscle Mike is the mighty midget of power in the TRANSPORTER that gets your material where you want it with new ease and lowest cost. Diagram shows how IN ONE MOTION and WITH ONE HAND, operator effortlessly controls every movement of your product with new ATCO ELECTRIC LIFT Model TRANSPORTER.

ONE HAND, ONE MOTION OPERATION

New double-position brake—applied either by raising or lowering guide handle, provides steering and braking leverage at the same time for hauling on ramps. All controls—forward and reverse speed, lift, steering and brake are so arranged they may be regulated by one hand and operated in one motion, simply by touching the buttons and guiding the handle.

Available in three standard units, 4000 and 6000 capacity platform model and 4000 pound capacity pallet model, TRANSPORTER also comes in companion models equipped with the ATCO Foot Lift at lower cost. Let an ATCO SPECIALIST show you how TRANSPORTERS end back-breaking, gruelling toil, release critical labor for more productive work, cut your material handling costs in half! Mail the coupon for complete facts. No obligation.

LOOK TO THE LEADER FOR ALL THAT'S NEW!

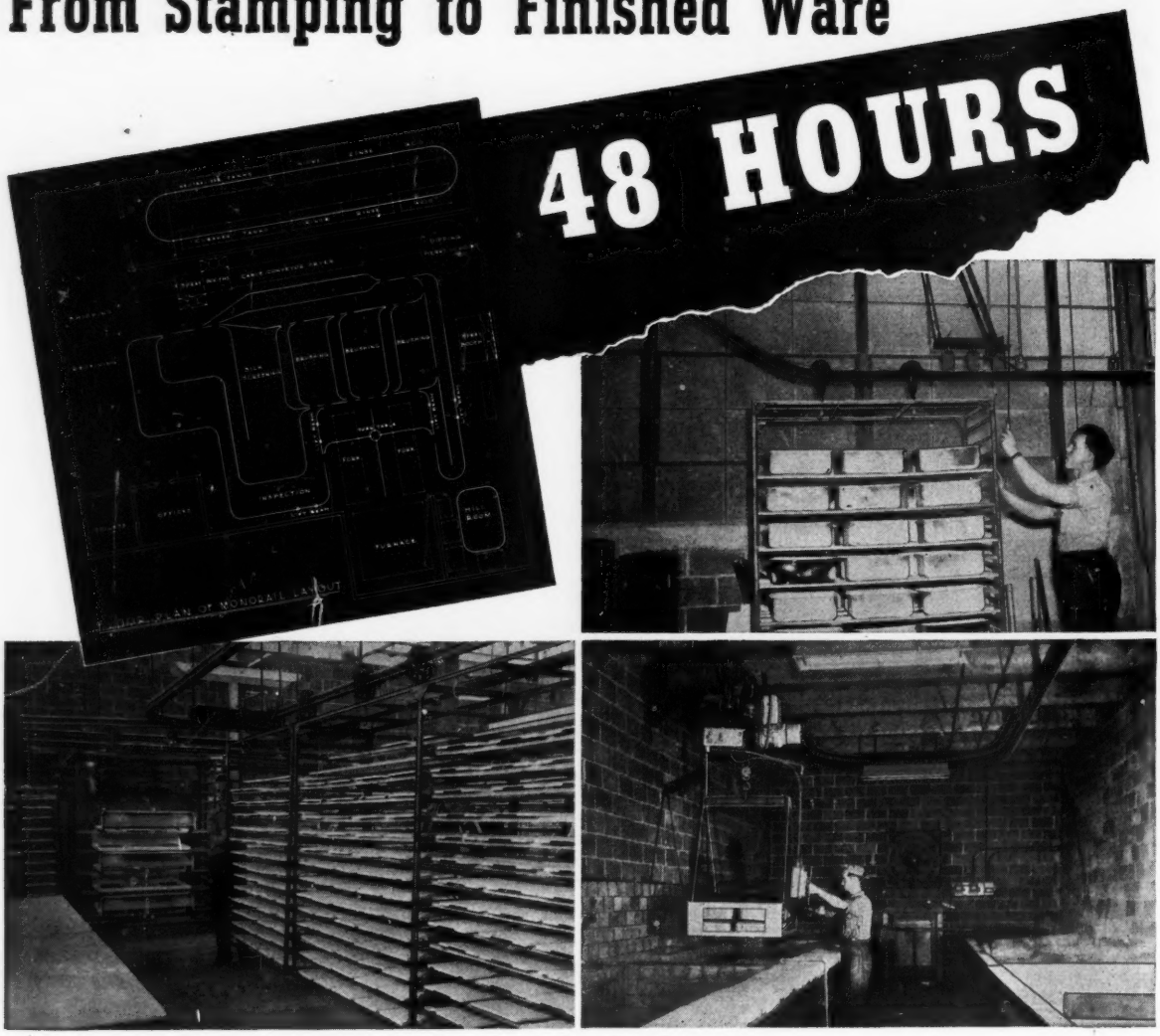
Transporter
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
141 West 87th Street, Dept. B7,
Chicago 20, Illinois

Mail me without obligation, facts about the NEW ATCO ELECTRIC LIFT TRANSPORTER
( ) Have an ATCO Specialist survey my handling costs.

Company Name.....
By.....
Address.....
City.....*State*.....

From Stamping to Finished Ware



(Finishfotos—Courtesy Dana Chase Publications)

Compactness and a steady flow of material were considered essential in this porcelain enamel ware and parts plant. The American MonoRail system over which all ware is handled, is compact, avoids bottlenecks and assures 48 hours turnover from raw stamping to finished ware.

American MonoRail equipment serves each operation. Flexible arrangement permits continuous and prompt flow of ware through all departments. An unusual feature is shown in top photo where a simple air device lifts racks from one level to another, permitting easier loading and unloading. In this plant, like hundreds of others, American MonoRail equipment tends to integrate entire operations.

An American MonoRail Engineer may be able to show you how to speed up your operations with no sacrifice to quality and with marked savings. We invite your inquiry.

SEND FOR BULLETIN C-1

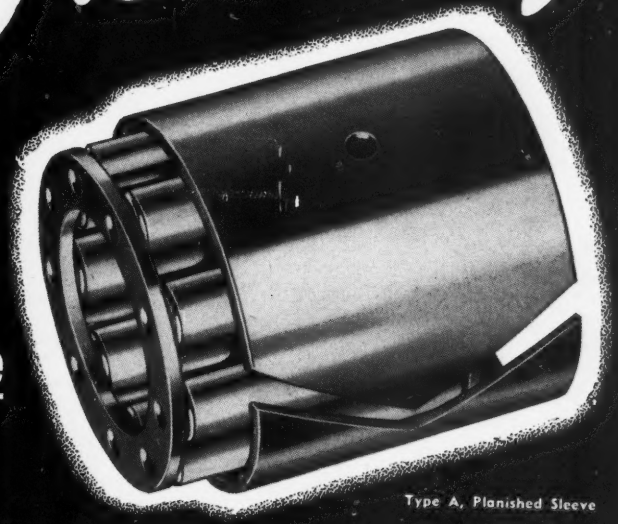
A 86-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13129 ATHENS AVENUE CLEVELAND 7, OHIO

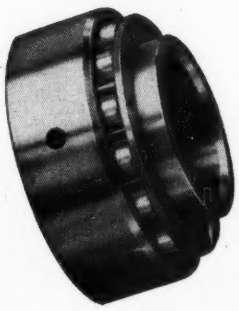
This Bearing

Gives You
Better Performance
at **Lower Cost**



Type A, Planished Sleeve

ROLLWAY *Steel-Cage-Type Roller Bearings*



Type D, Metric Series

Now what does better performance really mean? Simply this:

The Rollway Steel-Cage-Type Roller Bearings are made to give your equipment (1) Freer rolling . . . (2) Lower maintenance cost, . . . and (3) Greater efficiency.

Whichever way you look at it, *that's* better performance. And it has to be . . . because Rollway Steel-Cage-Type Roller Bearings profit from years of experience in the manufacture of Rollway super-precision-type bearings. But let's be even more specific!

Rollway Steel-Cage-Type Bearings will meet the tough demands of faster speeds, bigger loads and longer hours of continuous operation.

This is *truly* your bearing—a bearing Rollway has adapted to various material handling devices. And when you consider that its unit cost is less than many bearings offered for your job . . . when you consider that, on the assembly line, you can mount the parts of this bearing separately, with less time and labor . . . there should be no question about your choice. Rollway Steel-Cage-Type Roller Bearings *do give better performance at lower cost.*

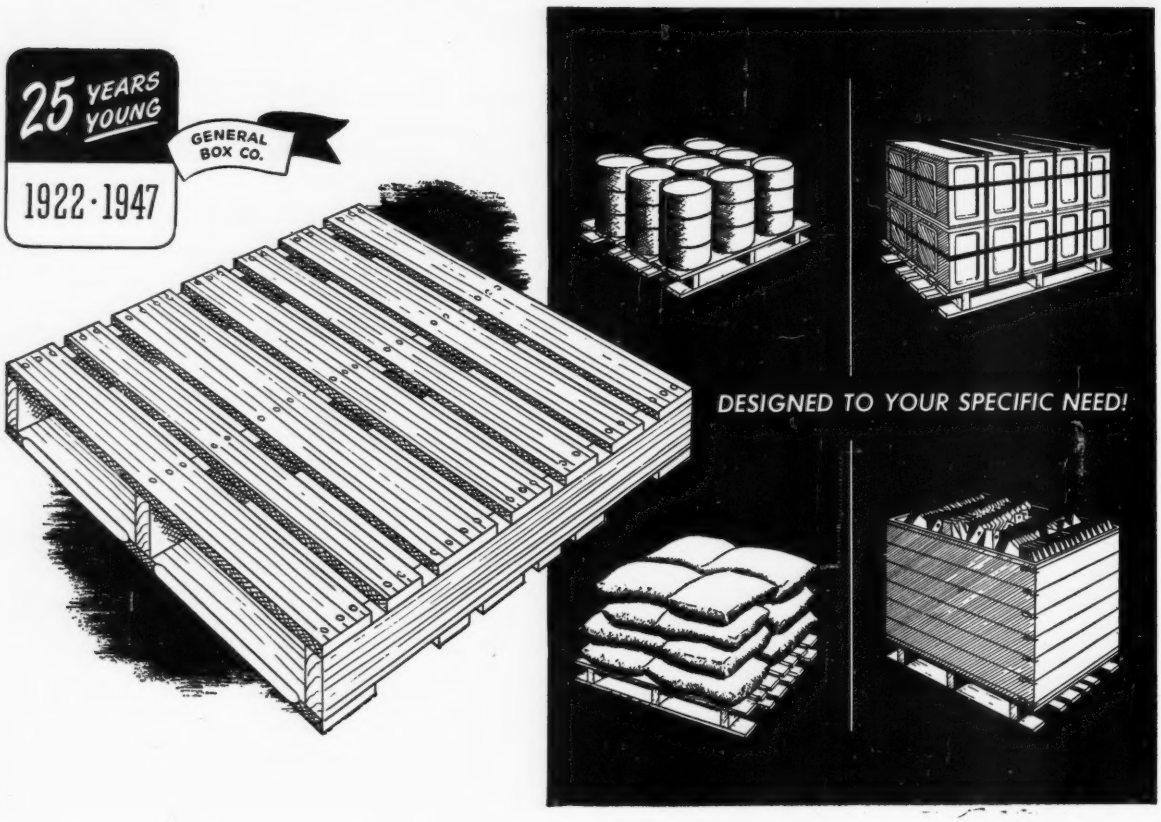
Send us a print or detailed description of your bearing requirements for free analysis and recommendation.

ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Los Angeles

25 YEARS YOUNG
GENERAL BOX CO.
1922·1947



Generalift ★★★★★ PALLETS

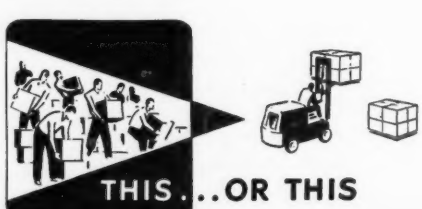
One workman and fork lift truck do the work of many. Instead of picking it up and laying it down, moving it piece by piece—many items can be consolidated into single loads, palletized, moved as one. That's why so many thousands interested in the speedier and more efficient handling of materials, components, and finished products are turning to pallets. That's why you, too, should check on this important subject *today.*

Generalift Pallets, Skids, and Lift Boxes are of sturdy hardwood construction. Designed for long life, rough handling, extra heavy loads—made to your specific requirements. For complete information, write for free Pallet Booklet.

ALL TYPES OF ENGINEERED SHIPPING CONTAINERS

GENERAL BOX COMPANY

GENERAL OFFICES: 60 West Illinois St., Chicago 10, Illinois
DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez. Continental Box Company, Inc.: Houston, Dallas.



ECONOMIZE . . . PALLETIZE . . . GENERALIZE!

Barber-Greene

FIRST! because they LAST!

The on-the-job lasting ability that identifies B-G Standardized Belt Conveyors is in large part due to these B-G all-welded tubular steel belt carriers. Protected from dust and grit by "four-pass" grease seals, their bearings—roller, ball or plain as the job requires—keep them rolling smoothly with minimum maintenance.

Heavy die-formed support brackets are welded to the self-cleaning base. And along with Barber-Greene sturdiness, B-G Belt Conveyors bring you the advantages of standardized design: selection of the right one for the job and erection on the job are simplified. See your Barber-Greene distributor or write Barber-Greene Company, Aurora, Illinois.

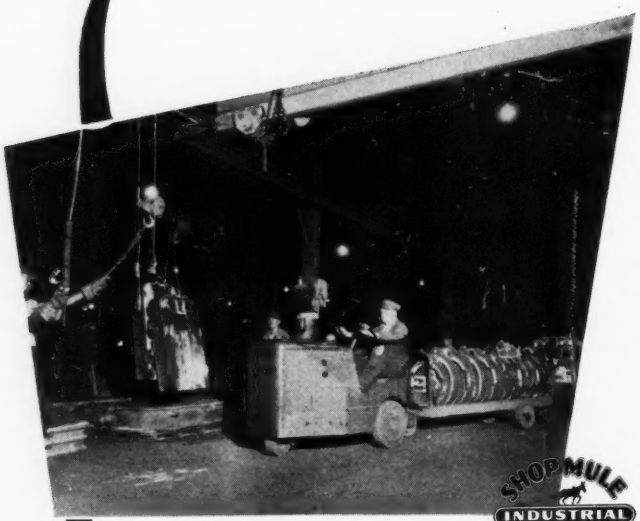
BARBER-GREENE COMPANY · AURORA, ILLINOIS

Constant Flow Equipment

LOADERS · PERMANENT CONVEYORS · PORTABLE CONVEYORS · COAL MACHINES · BITUMINOUS PLANTS · FINISHERS · DITCHERS

here's how
HEBARD
SHOP MULES

point up efficiency in vital handling problems

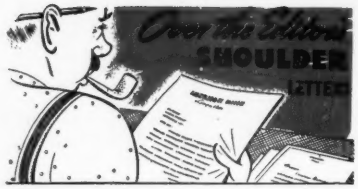


SHOP MULE of INDUSTRIAL TRACTORS

Smooth flow of materials and steady EFFICIENT production are manufacturers' dreams come true with SHOP MULES. Their speedy delivery of materials eliminates bottlenecks and relieves jam in every production department from receiving to shipping. ALL THIS with LOWER COST PER TON including original cost and tractor maintenance! Models ENGINEERED for every industry. Write—

INTERNATIONAL HARVESTER POWERED

W. F. HEBARD & CO.
336 W. 37TH ST.
CHICAGO 9, ILL.



To FLOW:
New Engineering School

The University has just recently set up a new School of Engineering in order to train young engineers for the growing industrial program in Southern California. We are very anxious to develop a library that will meet the needs of this new and growing program. It would be especially helpful for the students and faculty in Engineering if we could secure FLOW regularly . . . As a state institution our research services are freely available to the whole area, so a file of FLOW would have extensive use.—Robert Vosper, Head, Acquisitions Department, University of California, Los Angeles.

This letter is one among a number received from universities and technical schools. The need for a specific course of training in material handling has been previously urged in the editorial columns of FLOW.—Ed.

To FLOW:
Spreading Ideas

We have received the first issue (on our subscription) of the magazine FLOW for December, and we obtained an idea. . . . In January, February and March we expect to receive quite a bit of (liquid) honey in wooden barrels, with approximately 600 lbs. net per barrel. . . One of our problems is how to remove honey the easy way and put it from the barrels into open 5-gallon cans.—L. E. Sawyer, Bryant and Sawyer, Los Angeles, Cal.

Reader Sawyer may find the solution in the data sent him on drum cradles designed for easy manipulation of these containers.—Ed.

To FLOW:
High Praise

I will be in Cleveland January 16 attending the Material Handling Exposition and would like to meet some of your representatives. We feel your magazine is doing a nice job and would like to congratulate

MOBILIFT

Makes Every Hour More Productive

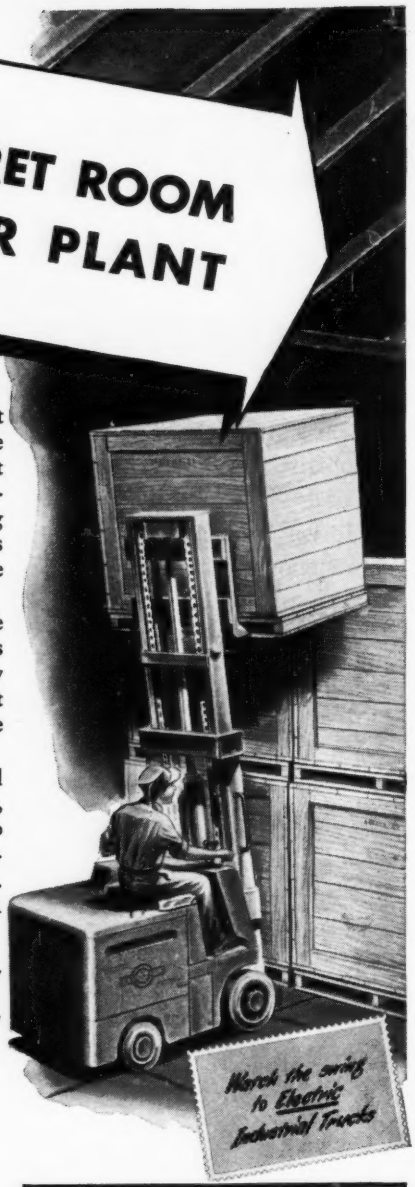
You can't increase the number of hours in your working day... but you can make each hour more productive. Mobilift's maneuverability saves time on every load—time that adds up to extra tonnage and lower handling cost each day. Thousands of American industries are cutting costs and increasing production with this efficient low-cost Lift Truck. Let our materials handling engineers show you how easily a Mobilift system can be installed.

Sales Offices:
34-48 Steinway St.
Long Island City, N.Y.
2430 So. Parkway
Chicago, 16, Ill.
107 Walton St., N.W.
Atlanta, Ga.

MOBILIFT *Moves Materials like a Giant!*

VAUGHAN MOTOR COMPANY ★ 835 S. E. Main Street, Portland 14, Oregon

THE SECRET ROOM IN YOUR PLANT



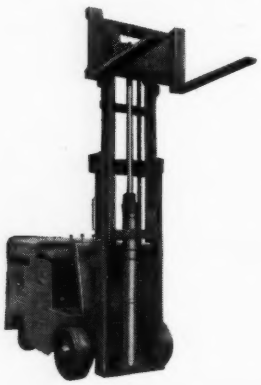
IT'S THERE — probably right where you need it most—more room for materials. Part of it may be right beside your machines. Part of it is on the loading platform where space is always at a premium. Part of it will be in your warehouse.

USE IT—that space above the five-foot-level! Clear your aisles and loading platforms. Simplify warehousing. The Crescent PALLETIER makes *vertical* space *usable* space.

The PALLETIER slips in and out of congested aisles and areas, negotiates steep ramps, steps up loading and unloading of common carriers, ends demurrage.

Send for the PALLETIER bulletin now.

CRESCENT TRUCK COMPANY
1155 Willow St. • Lebanon, Pa.
Member Electrical Industrial Truck Association



ELECTRIC
Crescent
PALLETIER

PALLETIER HIGHLIGHTS

- Operator spots and tiers without stirring from seat.
- All control levers at driver's fingertips.
- Full magnetic control protects against forced acceleration.
- Inspections and adjustments simplified by easy accessibility to all mechanisms.
- Minimum maintenance costs.

This is the truck to take loads off your mind.

you personally.—C. Colbert, Borg-Erickson Corp., Chicago, Ill.

To FLOW:
Bouquet and Check

We have been very interested in the articles presented in FLOW. If our subscription has expired with the December issue, please send us a bill . . . and we would be happy to send our check.—Willard A. Morse, Jr., Security Warehouse Co., Minneapolis, Minn.

To FLOW:
Paging Mr. Barclay:

The writer hopes to have an opportunity to meet you when next in Cleveland and to express personally his very sincere appreciation for the effective treatment you have given to material handling problems. We are particularly interested in Mr. Barclay's article on improved terminal operations.—M. J. O'Donnel, T. E. Ryder Machinery Co., Montreal, Que.

Mr. Barclay's article, "A New Method for L.C.L. Freight," appeared on page 36 of the December issue.—Ed.

To FLOW:
"Should Be a Must"

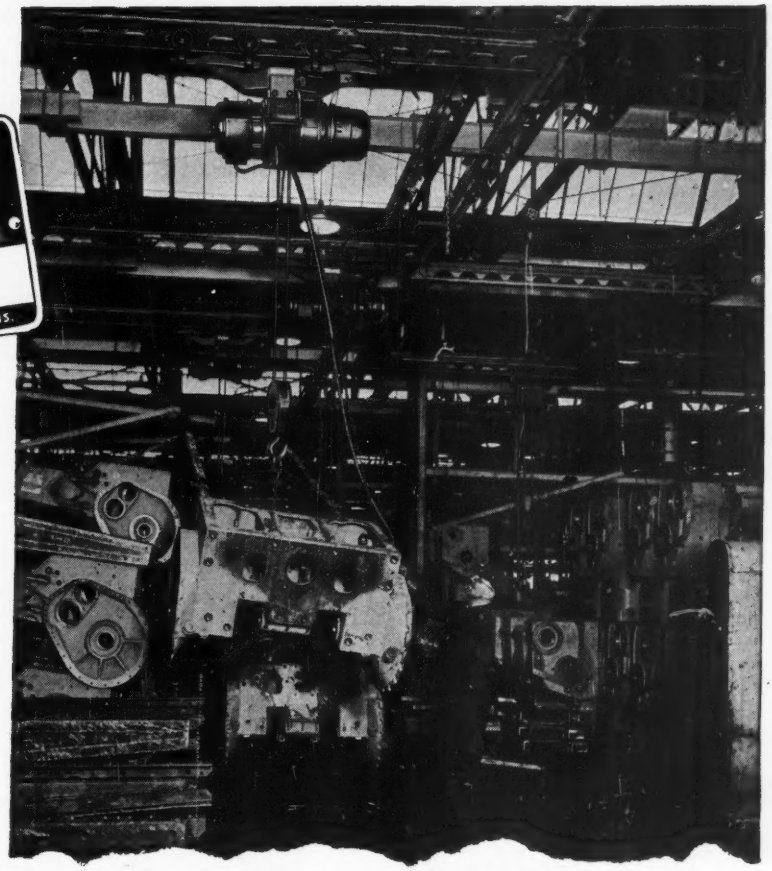
We wish to congratulate you upon your excellent presentation of the handling practices in force in various industries. Your magazine is extremely enlightening and should be a "must" in the files of informed managers.—Urban M. Lodge, Material Handling Engineer, Buhl Sons Co., Detroit.

To FLOW:
Two Viewpoints

In the November issue of FLOW on page 17, the photograph showing the application of cork insulation to tanks being accomplished with the aid of an off-center rope sling and overhead crane, does not seem to the writer to be the most efficient method of handling. . . I would like to suggest that the expensive overhead crane could be released for other activities if the tank were placed on a motorized set of rollers which could be operated by the cork installers as the

(Turn to page 14)

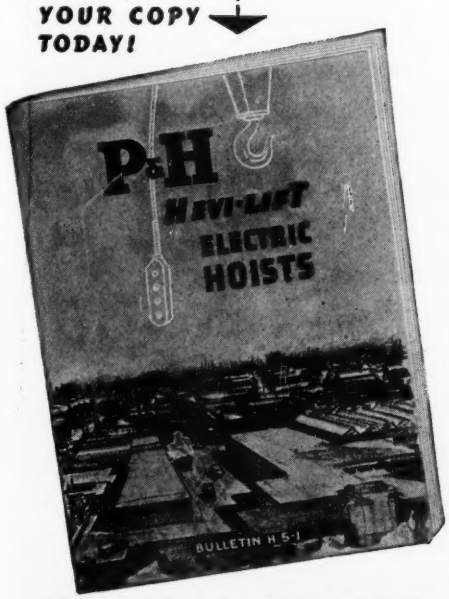
P&H
HEVI-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.



YOUR BIGGEST LOADS ARE ONE MAN JOBS

—when you move them "THRU-THE-AIR!"

SEND FOR YOUR COPY TODAY!



Bulletin H5-1 tells all about P&H Hevi-Lift Electric Hoists... where they're used... what kind of jobs they do. 50 pages of pictures and specifications. Get your free copy now!

Yes, one *man* does it all! Lifting . . . moving . . . "spotting" heavy loads exactly where they're wanted. And he does it all by pushing buttons!

Simple? Sure! So simple that more and more plants are finding "Thru-the-Air" handling the easiest way to cut costs — starting right NOW!

There's no waiting for results. Install a P&H Hevi-Lift Electric Hoist, and savings begin with the very first load!

Save these three ways:

(1) **SAVE TIME . . .** loads move direct, above congested aisles.

(2) **SAVE MANPOWER . . .** no wasted energies, no rehandling.

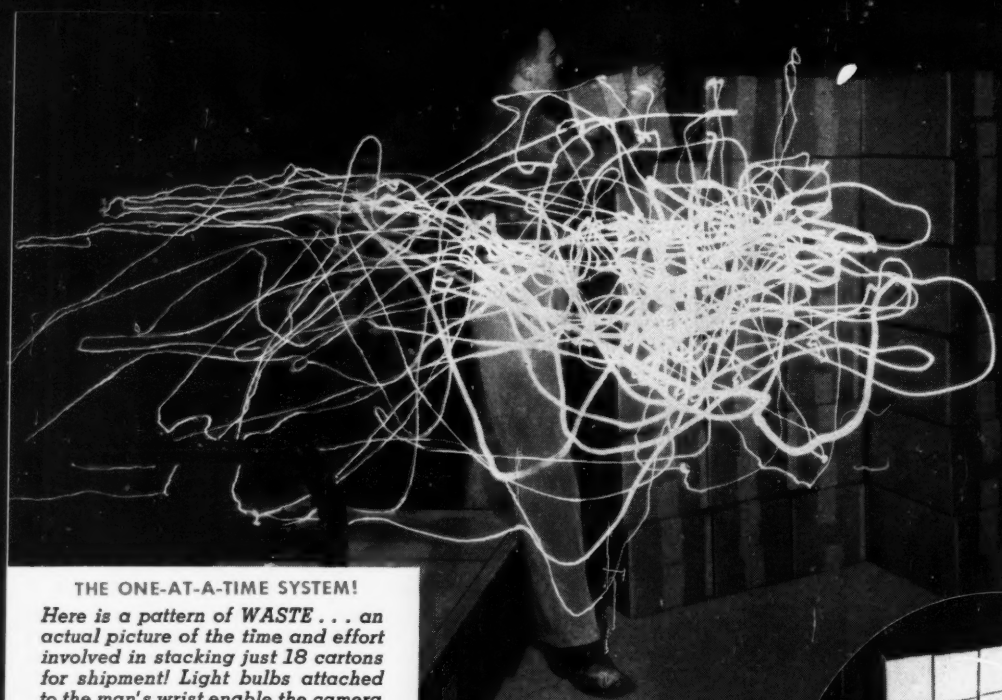
(3) **SAVE SPACE . . .** "Thru-the-Air" handling leaves floor space free.

Yes, all these savings apply to *your* plant. For details on capacities and installations, call in a P&H Hoist Engineer — no cost or obligation.

HARNISCHFEGER CORPORATION

HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

4643 W. National Avenue Milwaukee 14, Wisconsin



THE ONE-AT-A-TIME SYSTEM!

Here is a pattern of WASTE . . . an actual picture of the time and effort involved in stacking just 18 cartons for shipment! Light bulbs attached to the man's wrist enable the camera to trace every move.

Which Pattern Do *You* Follow?

Is yours the pattern of *waste* as shown in the authentic camera record above? Or is it the pattern of *thrift* at the right? (The same job as done with Barrett Lift-trucks and Skids.)

This particular job—stacking goods for shipment—is common to all plants. And all too often it's done the *costly* way . . . loads hauled to the shipping room on platform trucks . . . unloaded . . . set in piles to await shipment . . . then *reloaded* when trucks or freight cars arrive. The Barrett Lift-truck System eliminates all that! Your materials *stay on Skids,* ready to roll without reloading. And they always move in larger, more profitable, unit loads—*not one piece at a time.*

The Barrett System speeds materials from room to room, floor to floor, in and out of storage—so effectively that one man does more than 3 or 4! Let a Barrett engineer show you how . . . no cost or obligation.

THE BARRETT LIFT-TRUCK SYSTEM!

Here is a pattern of THRIFT . . . saving time and effort with Barrett Lift-trucks and Skids. See how materials stay on the Skid—in a big 45-carton load—while one simple move frees the truck for other jobs!

A bookful of money-saving ideas — yours for the asking. Write for your free copy of the Barrett Junior Catalog!

BARRETT-CRAVENS COMPANY

3257 West 30th Street • Chicago 23, Illinois

Representatives in All Principal Cities

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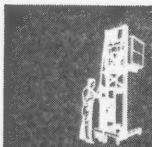
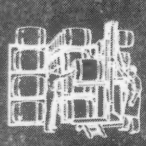
BARRETT

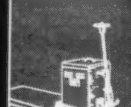
ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT



PORTABLE ELEVATORS



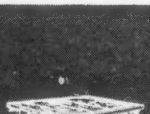
STEEL STORAGE RACKS



ELECTRIC LIFT-TRUCKS

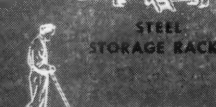
Barrett Handling Equipment

HAND LIFT-TRUCKS

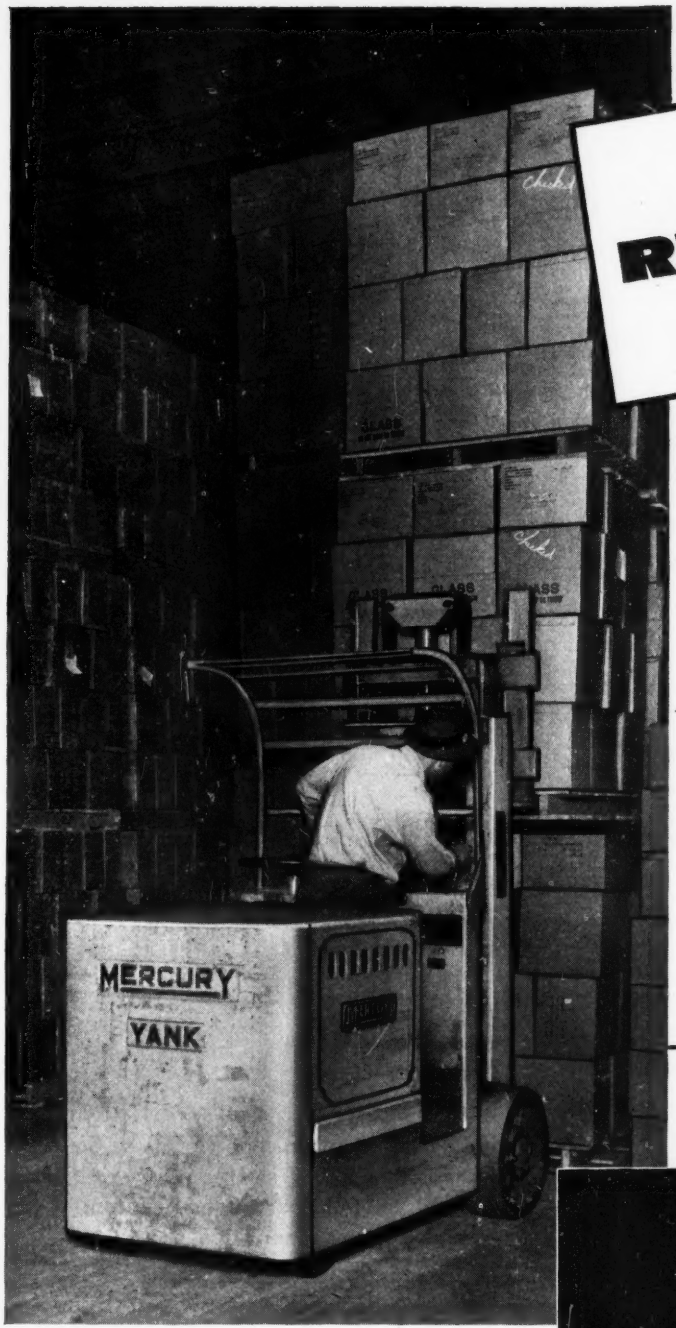


SKIDS

BARREL TRUCKS



NIFTY SYSTEMS



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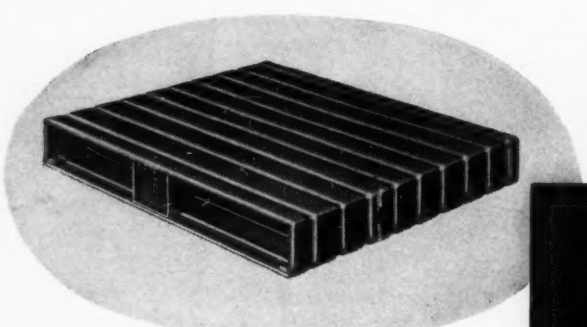

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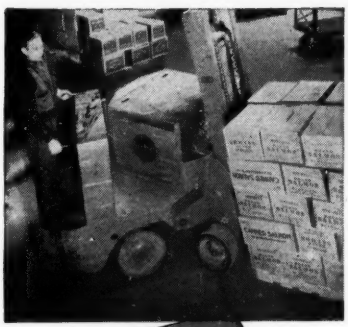

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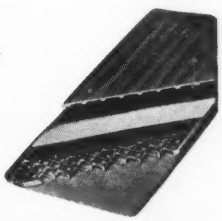

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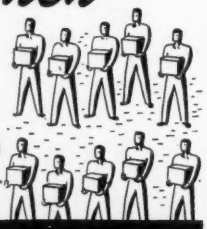

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LETTERS TO FLOW . . .

(Continued from page 8)

tank is required to be turned.

The basic material handling code of keeping handling equipment moving to pay dividends also holds true in this case.—R. A. McDonough, Material Handling Engineer, Westinghouse Electric Corp., Bloomfield, N. J.

Representatives of the company concerned reply to this as follows: We agree that the most efficient way to cork tanks is with motorized sets of rollers, and they are being used on our production lines. . . However, when custom built tanks are being run through production, which is the one illustrated, we do not always use rollers. We thought the turning of the tank with the crane was a good example of crane handling.—James D. Dwyer, Material Handling Supervisor.

To FLOW:
From England

I read your journal FLOW with considerable interest each month and find it one of the most interesting magazines of the many in circulation.—E. W. Hancock, Rubery, Owen & Co., Ltd., Darlaston, Great Britain.

To FLOW:
On Its Way

I have enjoyed FLOW and have found it quite informative. The best of luck for its future.—Walter G. Seinsheimer, Management Engineers, Cincinnati, O.

To FLOW:
Fills A Need

I believe your publication meets a long felt need. Material handling is fast becoming a very necessary branch of engineering. I wish you continued success.—R. W. Scott, Chicago.

THE SHOW WAS A BIG SUCCESS!

The advance report on the First National Material Handling Exposition, page 19, will be followed next month by a more complete report.

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You'll be startled when you find out how little it would cost you to have this fast-working Yale Fork Truck handle material in your plant. For, when Yale-power replaces man-power you get more output per manhour, increased production, lower unit cost . . . faster, safer, more efficient handling. Also, wasteful rehandling is eliminated, worker's energy conserved, storage space increased.

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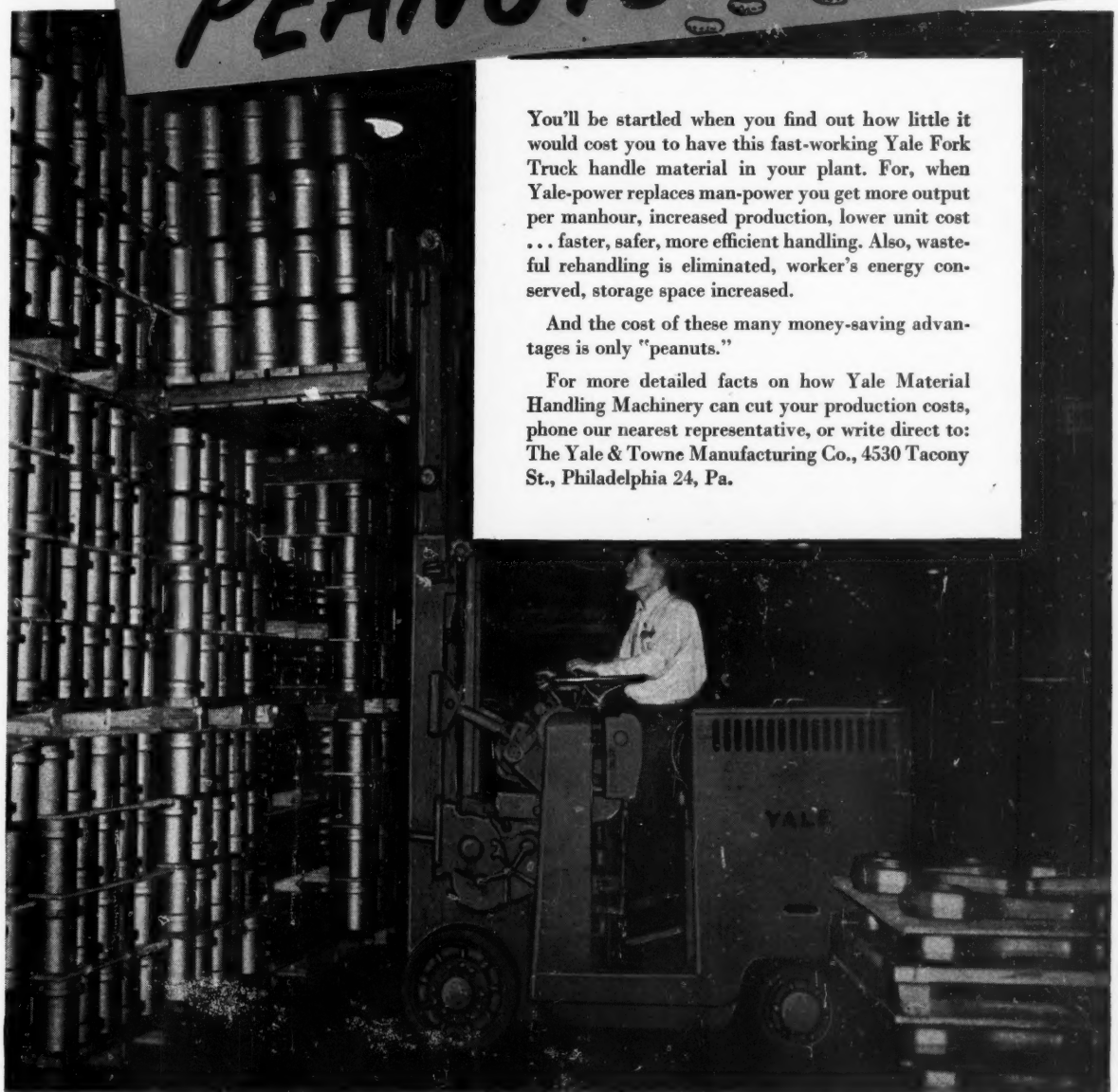

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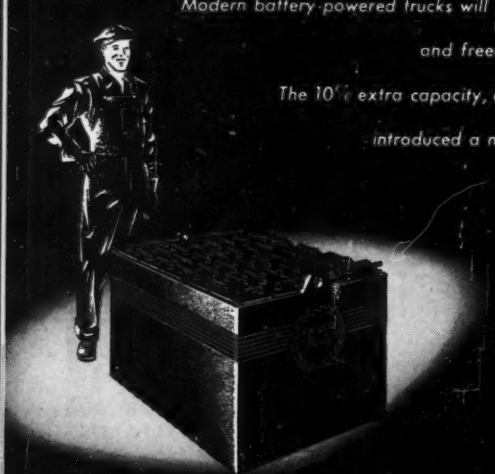

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Flow

The magazine which integrates material handling equipment into the flow of production.

Vol. 2, No. 5

FEBRUARY
1947

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F. G. HOWSON, Associate Editor

PRODUCTION DEPARTMENT
WM. V. LINAS, Director

CIRCULATION DEPARTMENT
E. J. HEXTER, Director

JIM CONNELL, General Manager

FLOW EDITORIAL AND BUSINESS OFFICES—
1240 Ontario Street, Cleveland 13, Ohio
Phone: Prospect 1251

NEW YORK OFFICE—LEE HAAS
60 E. 42nd Street, Room 950
New York 17, New York, Murray Hill 2-0488

CHICAGO OFFICE—NORMAN J. LOTT
64 E. Lake Street, Room 1110
Chicago 1, Illinois, Andover 4972

LOS ANGELES OFFICE—ROBERT H. DEIBLER
2506 West 8th Street
Los Angeles 5, California, FE-0303

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COVER PHOTO—A 170-inch-high shelf and a fork truck with a 172-inch lift. Weight of the motor being handled: 3,000 pounds. This is one of the many interesting features described in the article "Going High," page 20.

WHO GETS THIS EXTRA TONNAGE?

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***200* tons per truck per day;**

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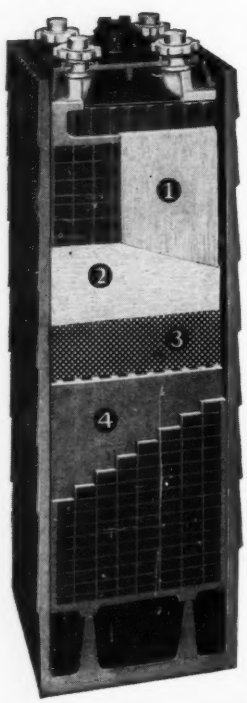

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A Success - - - - and an Obligation

Due to the peculiarities of our February printing schedules, this issue of FLOW does not carry the full report of the National Material Handling Show. The March issue will have a complete word and pictorial report of every phase of this most successful exposition

● ON TUESDAY morning January 14th at 10:30 a.m. there were about 500 men waiting for the doors of the first National Material Handling Show to open. Before the doors closed Friday January 17th over 8,000 men had passed through those doors and the show was an unqualified success from every standpoint. The exhibitors had a successful week because they had customers and prospects in their respective booths. The visitors were happy because they had the opportunity to see and learn more about this field than they had ever had. Never before had there been such a collection of equipment or such a collection of material handling experts in one place. So naturally the visitors benefited and went away happy. They came from every state in the union, as well as from foreign countries.

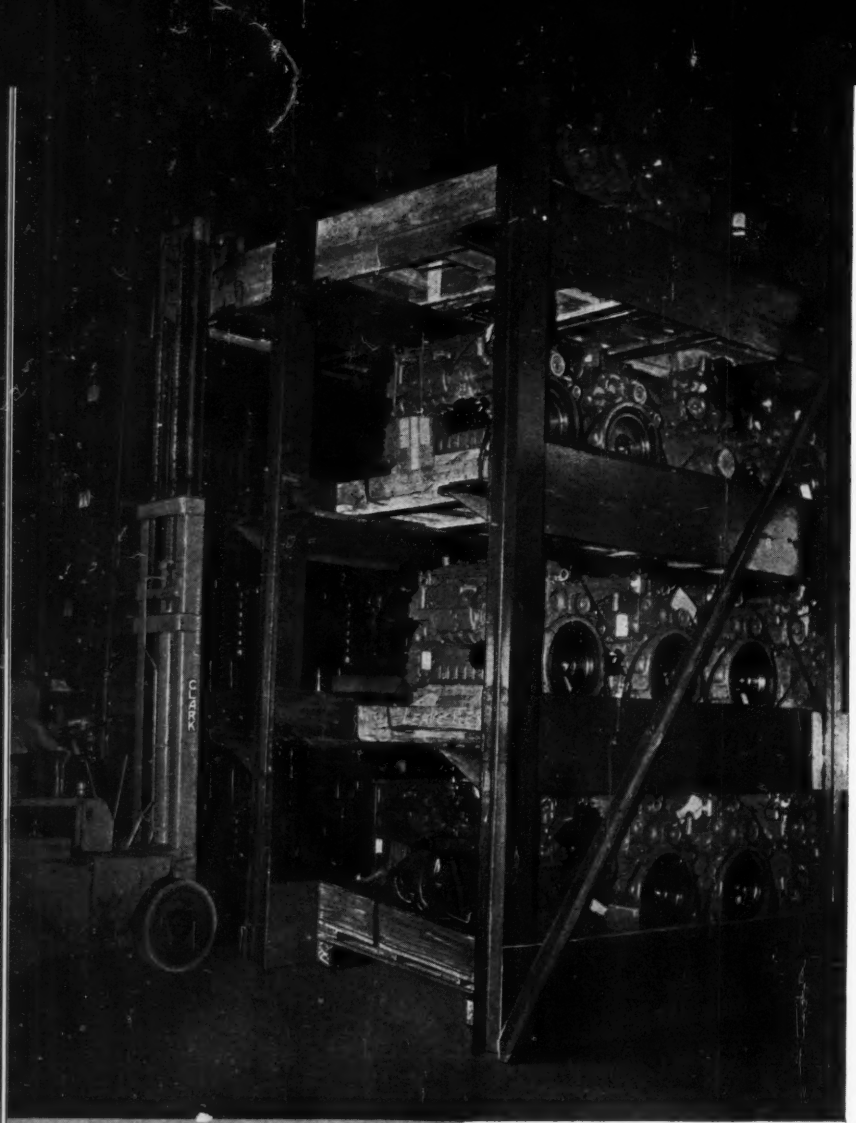
The few intrepid men who—because of their nerve and imagination and hard work—saw the show "go over" were happy that their brain child turned out so well. All in all it was a great week and it will unquestionably be the forerunner of many successful shows to come in future years.

The success of this show signifies many things. It signifies that the material handling industry has grown up, that it is an industry in its own right, and that it does not necessarily belong as a "poor cousin" to a lot of other industries. The science of material handling is basic in every industry. The material handling equipment people, with all their know-how as to material handling methods and their ability to build successful machines to accomplish these methods, are important partners in every industry in America. Every industry needs these men and their experience. These men hold the key to billions of dollars of savings throughout American industry. Daily, these material handling equipment men solve problems that yesterday looked unsolvable.

To have had such a successful show places upon the material handling industry an obligation. It is the obligation of continued research and development for the benefit of all the industries they can and will serve. It is the obligation to always sell the proper equipment for the specific application. It is the obligation to adopt broad-gauged standards for the industry so that it will grow and develop for the benefit of all other industries.

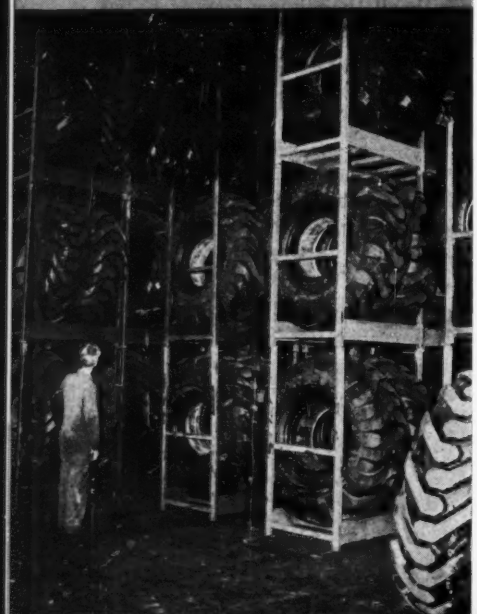
The spirit and work which made this most successful first show means that, unquestionably, through continued cooperation, this industry has a particularly brilliant future. American industry has barely scratched the surface in applying proper material handling methods to reduce costs. Broad-gauged education and cooperation will go far to attaining this goal, and our industry is equal to it.

with limited storage area for parts, management decided on GOING HIGH



This is special motor rack: capacity is 192 3,000-pound motors, tiered four high.

Section of portable racks used for storage of tires weighing up to 1,000 pounds apiece.



This manufacturer of earthmoving equipment engineered an up-to-date material handling system as an integral part of the company's post-war expansion. Heavy and bulky items—3,000 pound motors and 1,000-pound tires—are tiered to a height of 18 feet, among other striking features.

By CHARLES F. YARHAM
Methods Engineer,
The Euclid Road Machinery Co.,
Cleveland, Ohio

THE Euclid Road Machinery Company produces heavy-duty earth-hauling equipment up to 30-ton payload capacity, and the components of these units are therefore in the "heavy-stuff" category. Examples of such parts are nine-foot-long axle beams, complete truck cabs, tires measuring up to six feet in diameter, and motors weighing 3,000 pounds each. These and many other parts—large, heavy and irregularly shaped—had to be combined into "unit packages" for economical power handling and economical space utilization.

Start from Scratch

In the early postwar months, the company management gave the go-ahead signal for an expansion program, which called for a new building to house the assembly and storage operations; at the same time,

the existing machine shop and structural welding departments were expanded proportionately, using the space vacated at the "old" plant.

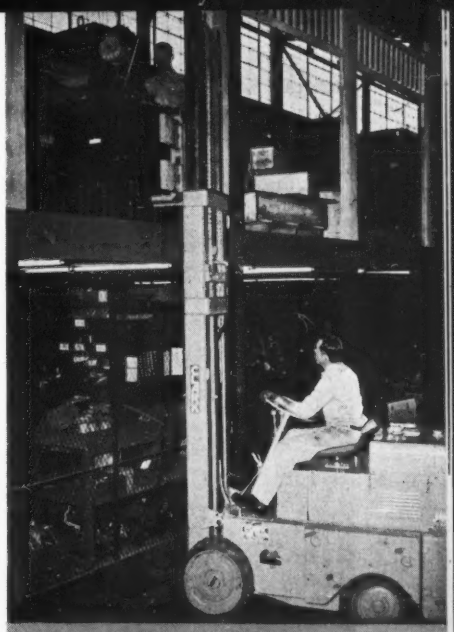
A large portion of standard items used on our equipment is purchased and shipped to us. This volume is augmented by the materials fabricated at the original plant, located about a mile away, and the combined tonnage presented a demand for large-capacity storage facilities at the new assembly plant. Although it is possible to hold the volume of parts requiring temporary storage from our own plant to a minimum, uncertainties on deliveries from our vendors put the load on our handling and storage facilities, and made an interesting problem in material handling and storage. We realized practically from the start that floor space would be at a premium, and that the ample headroom available would have to be utilized to the fullest extent.

We had to figure our aisle widths and storage locations practically down to the inch. In addition, excess quantities of parts requiring indoor storage would have to be transferred to our warehouse, without tying up too much space in the meantime. This made an interesting problem in material movement. Incidentally, shipping is not a problem because the finished trucks are shipped as complete units on flat cars.

We were fortunate that the company management recognized the importance of a good material handling program as part of the overall expansion, and were willing to invest in up-to-date equipment. We realized that the keynote of this program, because of the nature of our operations, would be flexibility — flexibility of equipment, layout, and material movement. The answer was to turn to lift truck operation, used to move container equipment specially suited to our requirements.

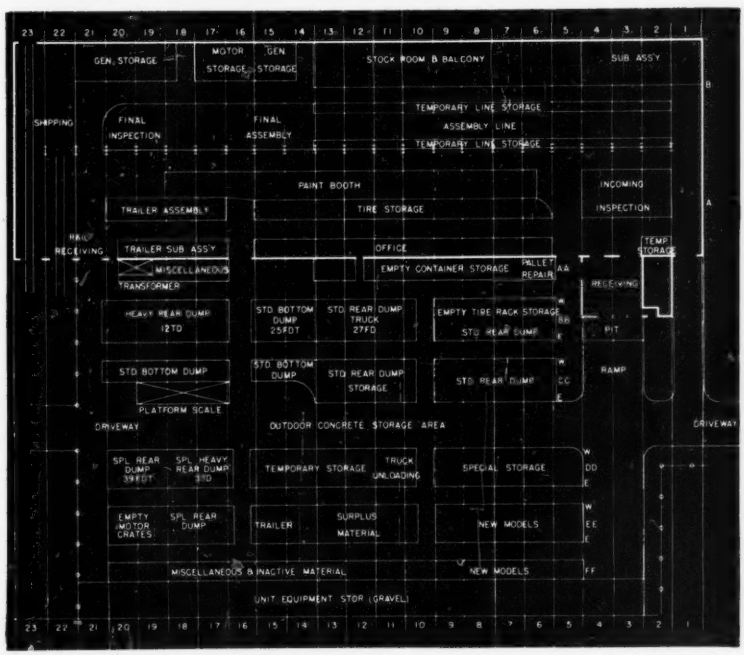
In view of the large variety in sizes and weights and the complicated shapes of parts that go into "off-the-road" trucks, it was necessary to standardize on as few basic types of container equipment as possible. At the same time we attempted to plan for parts expected in future models. The five basic types of mobile containers which we adopted have reduced the number of "sticklers" to a minimum.

In order to determine the sizes and types of container equipment needed, it was first necessary to analyze the movement of each part step by step from receiving through storage to assembly, estimate expected quantities, find sizes and weights, and balance all these



High-lift spots bin on mezzanine for handling by 2-ton crane. Note safety gates are raised.

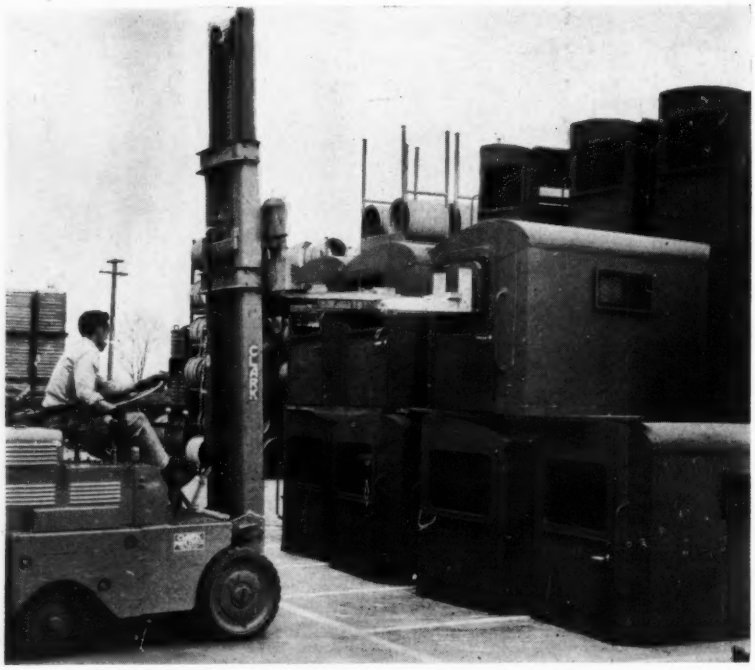
Differentials tiered in sectioned pallet boxes. Note the extra stringers being used.



Layout of new plant and adjoining concrete storage yard. See article on use of wall index.

factors. Some of this information has since been used on a visible record index system described further on.

Besides the indoor floor storage area, where headroom was more plentiful than floor space, additional storage space was made available indoors in a mezzanine over the parts stockroom, and outdoors in a large concrete area, running the length of the building, for parts able to be stored outdoors. This article therefore covers both indoor and outdoor operations.



Special wooden fork extension designed for handling complete cab assemblies. See article.

Layout Features

All material is laid out in designated areas—outside as well as within the plant. Parts without machined surfaces are stored in the concrete yard area. As indicated previously, the larger portion of the material is shipped by vendors. It arrives by truck at the covered dock of our new plant, and by rail at the opposite end of the building. Both the highway truck and railroad cars are unloaded at floor level by means of depressed receiving pits. The items are placed in the proper type container at the receiving point.

As previously mentioned, a wall index has been provided to indicate the storage locations and types of containers for the various arriving products. The specific storage location is noted on the move card attached to each load at receiving, and thus the truck operator knows exactly where the material is to be stored. To do this, a layout of the storage areas was first made with two-dimensional templates (⅛ inch to one foot). On this layout was marked the specific location of each type of part, providing space for a maximum of material in each area. Each yard storage strip is designated by an alphabetical symbol, starting with AA, advancing eastward through FF, and numerically north and south, the numbers advancing every twenty feet southwards.

To supplement the index, a file is being developed which contains photographs and sketches that show certain parts — particularly those with peculiar features—are to be loaded, piled or strapped.

Our concrete storage yard, which adjoins the new assembly plant, is approximately 400′ x 200′ (see layout sketch). Five aisles parallel to the building, including the main 30-foot driveway, divide the yard the narrow way into four 25-foot-wide storage areas, and 13-foot widths adjacent to the building and on the edge of the concrete away from the building, where the entry is from one side only. These 25-foot storage strips provide a depth of 12½″ from each side. The width of the two main aisles is 12′ because of the 6,000-pound capacity trucks used for many of the transporting jobs. All material is segregated on the basis of truck types, using as a nucleus three standard models, and allowing for slight variations. Thus parts for each off-standard model are kept in special locations within the general area allocated to that particular truck. These are indicated in the diagram.

The assembly operation within the oblong plant is straight-line. The heavy truck units are advanced on flanged-wheel dollies which are propelled by floor chain. This line is covered by semi-gantry cranes, and is flanked by the small-parts stockroom on the west side. Over this stockroom is a mezzanine deck, used for storage of medium sized parts in tierable steel skid bins, as shown in one of the photos. This elevated section is covered by a traveling bridge crane of two-ton capacity. The loaded bins are placed on the balcony by a high-lift fork truck, and are then moved and tiered three high by the crane. (The smallest types of parts are delivered from the stockroom below in special stock carts described in the December FLOW article "Flexible Parts Carrier.") The balcony floor was specially designed to carry extremely heavy loads.

The heavier types of items are fed to the line from the east side floor storage area. Among these are machined parts and others on

Triangular diesel fuel tanks, four to a pallet. Note back-to-back piling for even loads.

pallets and in open-end containers; tires are stored in sectionalized racks, and motors in a permanent rack. Material is spotted on a storage strip six foot wide and on either side of the assembly line. From these strips parts may be taken either by hand or by semi-gantry to the assembly.

We were able to employ standard material handling equipment in many instances, but had to supplement these with special containers designed to our own specifications. The types of containers, and how they fit into our handling operation, are described in the following paragraphs.

Skid Bins Used Extensively

While some of our items are on the "unusual" side, several groups of parts are handled in corrugated steel skid bins (tub dimensions are 36″ x 32″ x 21″). In this category are medium sized castings, machined parts, and various types of fabricated items handled in loose form. These containers are employed both in our outside and indoor storage areas, and are used by the hundreds. Thus they are the nucleus of this part of our operation. The bins are especially adaptable to the parts in our machine shop, where they are handled by powered hand lift trucks.

The bins are equipped with tiering lugs and attachments for crane handling. While a smaller under-clearance would have been sufficient for fork truck handling, we specified a 12-inch under-clearance for these units. Here's why. When the bins are tiered on the mezzanine deck, it is at times necessary for the stockman to remove individual parts. The 12-inch clearance between bins enables him to reach in and remove any needed material. Individual items are thus completely accessible, making it unnecessary for the crane to detier any loaded bins when the need for a few parts arises. Previously the numerous parts in this category were stored single deck.

Since our present bins can be tiered five high where the headroom permits, it is apparent that they contribute importantly to space conservation. This was an absolute essential, particularly in view of the fact that our expanded production was greater than our physical expansion in relation to material handling. Although we had a new plant, our floor area was comparatively limited but the overhead permitted us to go high.

For Long Lengths

Another type of container—an open-end skid bin measuring 60″ x 32″ x 21″—was adopted as standard for items less than 32″ in width and nine feet in length. In this group are such components as axle beams and steering columns. This three-sided skid box is simply a modified and enlarged form of the bins described in the preceding section. Except for the difference in length, the only other difference is that these units are without end walls. This permits parts up to nine feet long to extend two feet over each end. To obtain rigidity, tie bars, located at the open ends, are hinged at one side and locked at the other. These containers are likewise constructed both for fork truck and crane handling, and, in addition, can be picked up either from the ends or the sides. Thus when long lengths overhang the ends, the containers can be picked up and transported sideways by fork truck.

As in the case of much of our other material, parts in this group were formerly stored loose in piles, or on dunnage, and were handled largely by manual means. The adoption of these tierable containers has likewise saved precious floor area and speeded handling operations.

Assembly line covered by semi-gantry cranes. Note storage strips, containers at both sides.

Tires Go 18 Feet High

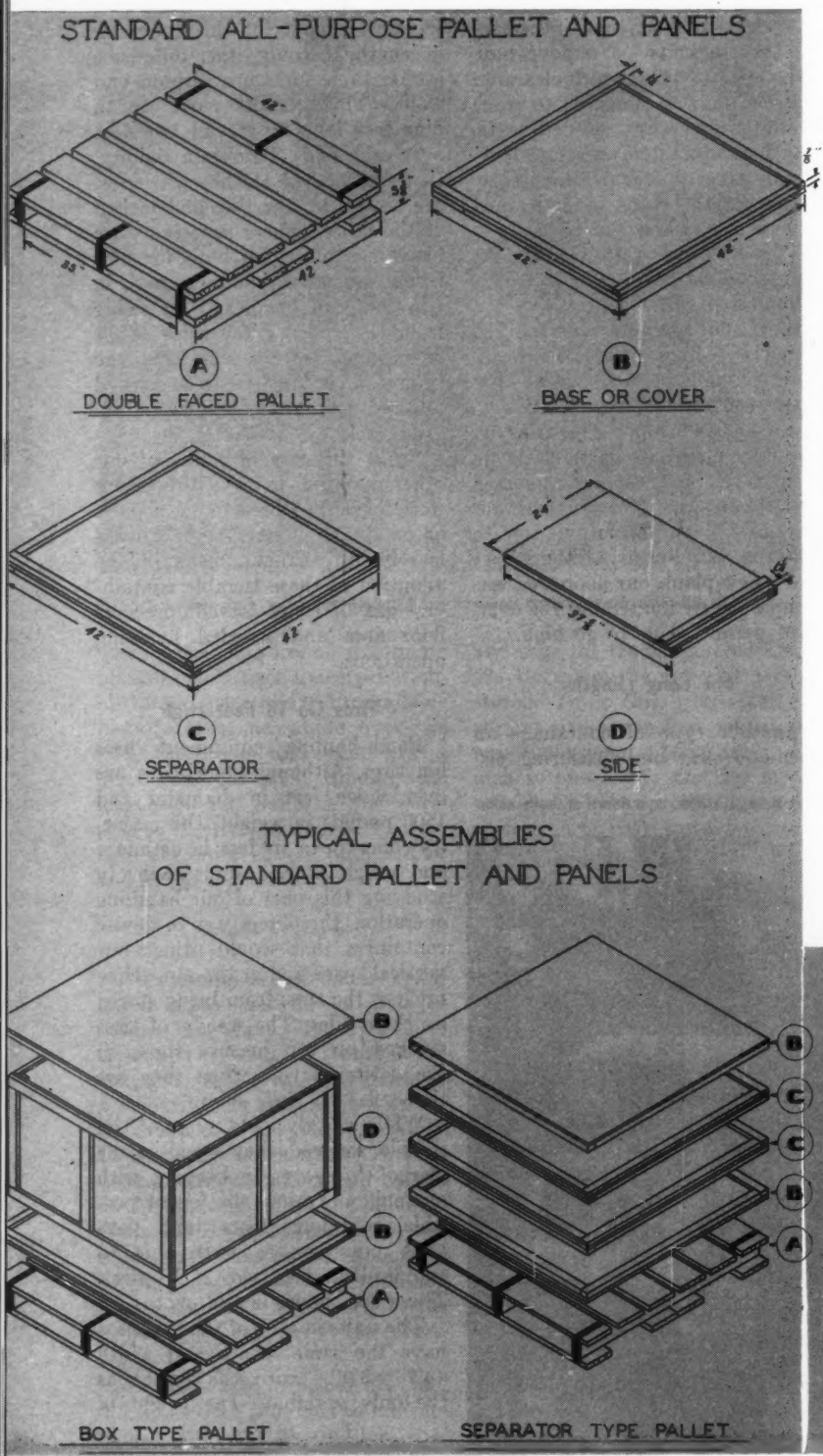
Earth-hauling equipment uses big tires. Although some tires are over seven feet in diameter and 1500 pounds in weight, the majority come up to six feet in diameter and weigh 1,000 pounds each. In studying this part of our handling operation, the object was to devise containers that would utilize our vertical space and at the same time prevent the tires from being stored on their sides. The weight of tires stacked on top mashes those in the bottom layers when they are tiered flat on their sides.

While a fairly wide range of tire sizes is involved, they are all in the "large" category. In keeping with our policy of using the fewest possible containers consistent with good practice, we were able to standardize on two rack sizes. These are shown in the photos.

The units in each of the two sizes have the same length and width (4′7″ x 3′0″), with the height as the only variable. The height of

(Turn to page 49)

Standardization



By **HARRY W. CARPENTER**

Material Handling Engineer,
International Harvester Co., Tractor Works,
Chicago, Illinois

WHEN numerous plants of a company move an annual volume of millions of tons of material in interplant shipments, you can expect a problem of standardization in load carriers to crop up sooner or later. The tendency is to design special pallets for each of many different product groups; it is often not apparent at first how products of different contours and weights can be combined into a uniform package. But when the number of specialized pallet designs has grown to a certain point, a critical reexamination usually reveals that a standard type can eliminate many "specials." The result of such standardization is a remarkable reduction in costs and manhours, a simplification in handling and packing, accelerated movement of materials, inbound

Detail drawings (on facing page) of standard pallet and three panels that replaced scores of special load carriers previously used in the company's plants. Note that the end boards of the pallet are reenforced with 1" steel strapping. The photo on the facing page shows some of the many different types of parts shipped in inter-plant movement by use of the standard load carriers recently adopted. See article for details on numerous benefits that resulted from standardization.

By eliminating scores of special pallets for differently shaped products and adopting a standard, all-purpose pallet system, the International Harvester Company materially reduced the cost of interplant shipments of tractor assembly parts. There's a good deal of ingenuity in this commonsense standardization project—and ideas that may be applicable to your own problems.

at INTERNATIONAL HARVESTER

and outbound, in addition to other operating improvements.

Evolving a Standardization Project

Within the past year the need for a simplified palletization program throughout the International Harvester Company became apparent. Our 20 larger plants, located within a 500-mile radius of Chicago, are handling per year several hundred million pounds of materials which are fabricated at one factory and sent for assembly to another. Each of the Harvester plants receives material from one to 10 of the other plants, depending on its own manufacturing program. This tremendous volume moving in interplant shipments indicates a high degree of plant interdependence. Material must arrive in the right quantities at the right place—and in good condition. Production schedules depend on it.

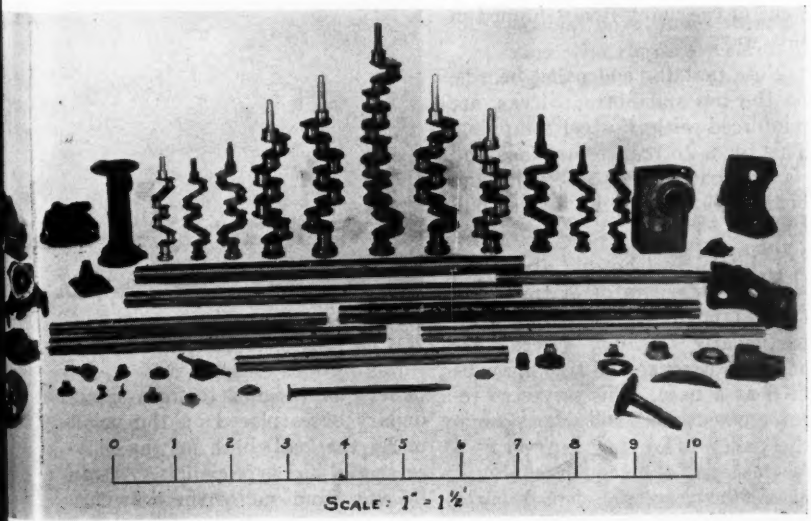
Each of our 20 larger plants had been working, to a smaller or greater degree, on a palletization program of its own. Each plant was making progress but each approach was individual, with the result that the program in every plant differed from the others. Consequently many different types of pallets and load carriers were being employed. The top management of the International Harvester Company realized this and gave its full support to a program designed to coordinate and simplify the handling activities of all our operations.

It was decided to hold a yearly conference of all plant material handling engineers and management. The purpose was twofold: to discuss progress and to present problems. In addition to the yearly conference, a materials handling advisory committee was set up to meet monthly. Its objectives were likewise twofold: 1. To perpetuate the beneficial results developed at the conference. 2. To cope with company-wide current problems.

The materials handling advisory committee includes one member from each of our divisions, such as industrial power, motor truck, farm tractor, farm implement, refrigeration, as well as representatives from our manufacturing research department, traffic department, and foreign operations.

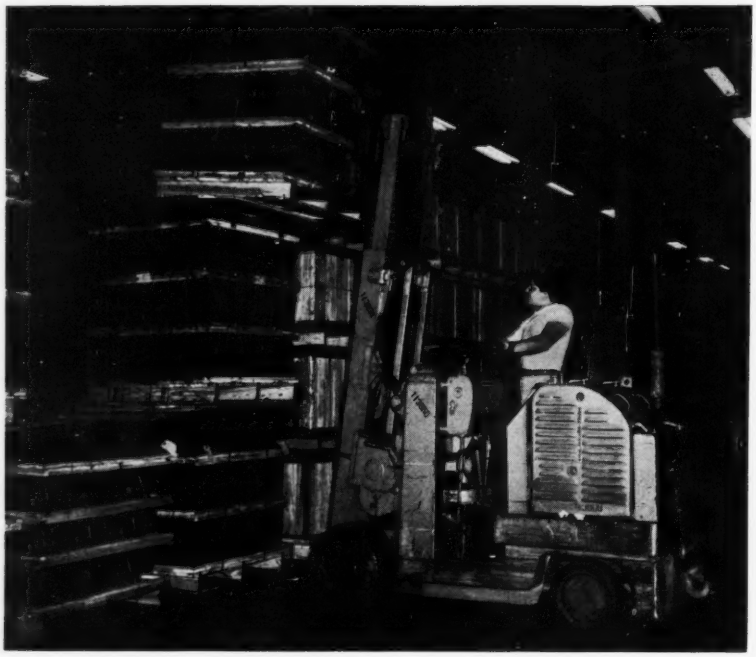
As indicated, one of the main functions of the committee is to set up company-wide standard material handling procedures and to promote exchange of handling information among all Harvester operations. Systematic dissemination and exchange of such information is basic and vital. An efficient practice may be a "gold mine" in one plant, but it is a loss to the organization as a whole when a generally applicable method of improvement is needlessly confined.

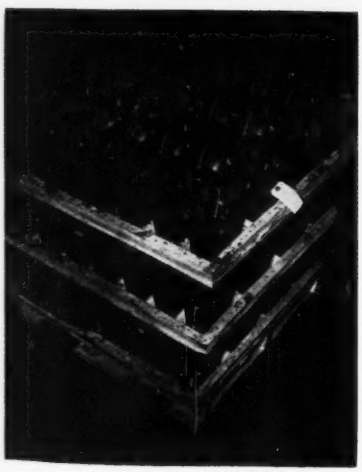
One of the first assignments given our material handling advisory committee was the development of a standard, all-purpose pallet system. The first step in doing this was to request each plant of the company to submit suggested designs for the standard load carrier, together with data that would support its practicability. The suggestions received were reviewed and discussed by the committee. The outcome was the 42" x 42" pallet and the separators, covers and box panels illustrated on these pages both with drawings and operational photographs.



One Carrier for Many Parts

One of the photos shows the wide diversity of parts which are today successfully handled by means of the all-purpose pallet. Their weight ranges from a small fraction of a pound to several hundred pounds each, and their size from a





Housings: 138 pieces; total gross wt. 2830 lbs., photo above. Wire strapping is extensively used. Photo at left shows piling pattern for load capacity and safety.

few inches to several feet in length.

The 42″ x 42″ pallet was selected because the bulk of our shipments is made by motor truck, and pallets of this size can be spotted side by side on standard highway trailers. Incidentally, while the accompanying photos show 7/8″ hardwood being used for the three types of panels (bases or covers, separators, and box sides), it is recommended that all such standard pallet panels be made of 3/8″ plywood. Since the latter material is in very short supply at present, we are for the time being substituting 7/8″ tongued and grooved hardwood.

As can be seen from the drawings and the photos, the double-face 42″ x 42″ hardwood pallet is the foundation for any of the two additional variations developed by use of the box panels or the tray separators.

1. By itself, the pallet is used for large regularly shaped material capable of sustaining weight. These parts can be piled in layers by use of wood inserts and securely banded for shipment to our other works. Crankcases, cylinder heads, tractor wheels, drawbars and flywheels are some of the many items shipped in this way.

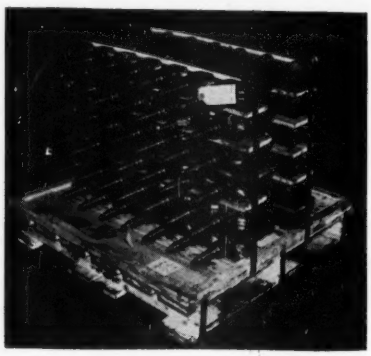
Note that the end pallet boards, on the top and bottom decks, are reinforced with 1′ steel strapping. This tends to reduce breakage and repairs, particularly since the end boards are usually the first to pull out.

2. Little need be said about the well-known separator or tray pack type. I might mention that when particularly heavy pieces are handled, a separator tray may be used as a base. This serves as reenforcement and will also protect the pallet. The tray pack is used for material of irregular contours, or smaller regularly shaped parts, capable of sustaining weight. The majority of items shipped in our plants are best handled with this type. Examples of such items are pistons, sleeves, track rollers and radiator cores.

In this connection I would like to mention one related point—the matter of piling the individual pieces on the pallets or separators. Particular attention must be given to this phase of the handling, with a view to developing a specific pattern for each item. Poor piling can result in damage to the material in transit; almost certainly it will interfere with good storage practice and prevent full utilization of cubage, besides loss of load capacity per pallet. Two of the photos are of loads with the covers removed, in order to show the specific pattern used. When a pattern has been found the most efficient method of piling certain individual pieces, it should be adopted as standard.

3. The collapsible box type is the second variation developed by use of standard panels and our 42″ x 42″ pallet. Constructed of an interlocking design, it is practically weatherproof and permits outside storage of finished material for reasonable periods of time. This "package" is particularly useful for smaller parts, of regular or irregular shapes, or for fragile materials, which may or may not be capable of sustaining weight.

A few explanatory words about the panels used. The base or cover



Strapped crankshafts: 42 pieces; total gr. wt. 2425 lbs. Base panel is also used for box.

panel was designed to form a secondary base (placed on the pallet under the load) both for the separator and box type pallets. As can be seen from one of the drawings,

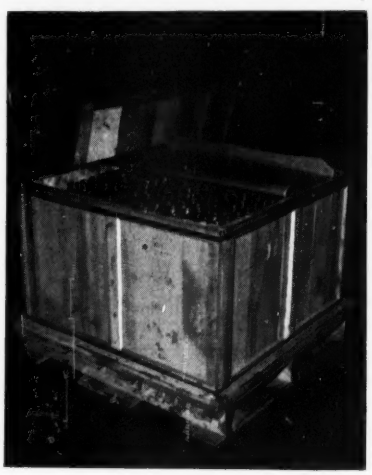
this panel has a ridge on one side only. This serves as a retaining strip for the first layer in the tray pack; it also supports the sides of the box type pallet.

The panel used as a separator is similar to the base or cover panel, with the exception that it has a

Belt pulleys: note nested piling pattern. 144 pieces; gross weight of load is 2425 pounds.

cleat both top and bottom, serving as retaining strips.

The box side panels form of course the four walls of the pallet box, set up on the base panel. The standard box panels used at present have an inside height of 24



Clutch release sleeves. ¾" strap on box. 16-64 pieces; gross weight of load 3117 pounds.

inches. It is possible that an additional size of 18 inches may be adopted.

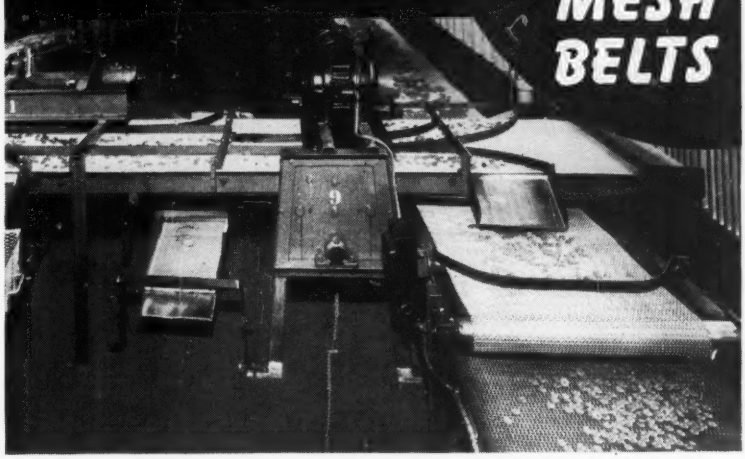
Thus, with one standard pallet and three standard panels it is possible to assemble in quick order containers suitable for any of dozens of different piece parts. As the material to be shipped arrives in the packing department, the operators know immediately which panel to use. No time is lost because of delays that are characteristic of "special" handling or packing.

Standardization Pays Dividends

The standarization program has been of help during our post-war expansion program which has called for a considerable increase in manufacturing facilities. This has involved relocation of some manufacturing operations, and the company was faced with the problem of doing this without suffering loss of production. Essentially this amounted to a tremendous handling and storage problem. The magnitude of the problem was greatly reduced by the application of the standardization pallet program.

The advantages and improvements inherent in the standardization program may be specifically

CAMBRIDGE WOVEN MESH BELTS



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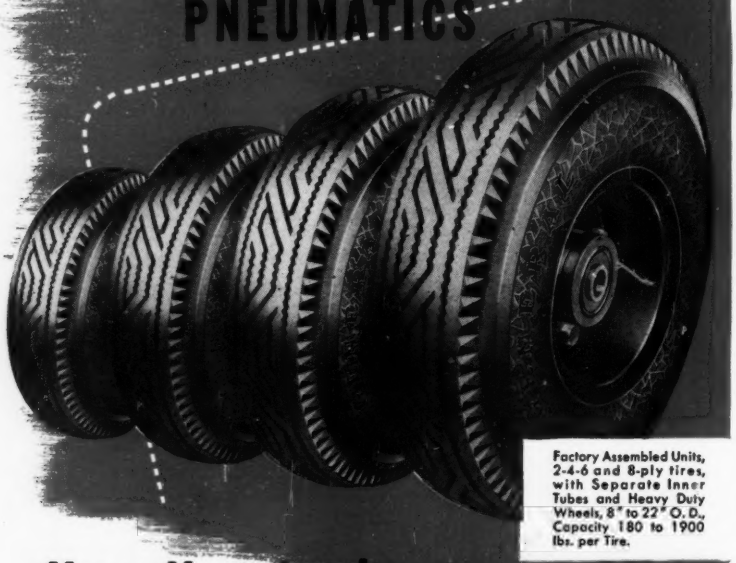

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listed as follows: 1. Elimination of hundreds of special pallets for shipment of specific materials. 2. Pallet cost reduced. 3. Control of pallets simplified. 4. Production flow simplified. 5. Cost of accumulation and return of empty pallets reduced appreciably. 6. Cost of pallet maintenance halved. 7. Effective use made of warehouse space because of standard 42" x 42" pallet size. 8. The all-purpose design

51 parts on standard pallets. Note use of cube, good housekeeping, orderliness in warehousing.

eliminates scrapping of special pallets when production models are changed. 9. Appreciable improvement in orderliness and good housekeeping. 10. Proper packing results in better product protection, reducing damage loss.

Thus, from the standpoint of cost as well as operational efficiency, it is felt that the standard all-purpose pallet program has proved its value. The more universal use of this system throughout the Harvester Company, it is likewise felt, will result in further savings.

MARCH ISSUE BRIEFS

A report on a ceramic plant that has done the unusual in mechanizing operations traditionally performed by manual means. . . . A four-point bar stock receiving operation designed for easy stacking. . . . How a user of steel wire coils moves a heavy tonnage of this material by use of a well designed system that coordinates on-the-floor with overhead equipment. An exceptionally efficient operation. . . . The lint problem in cotton textile mills is effectively solved with automatic cleaners that travel on monorail tracks and keep the lint off machinery and ceilings. A novel load unit carrier in a household goods storage company. —You will see these and other articles of interest next month.

LONG LENGTHS IN NARROW SPACES

Twelve-foot-long crated rolls of printed floor covering are handled by crane and dollies into and out of narrowly spaced storage racks.

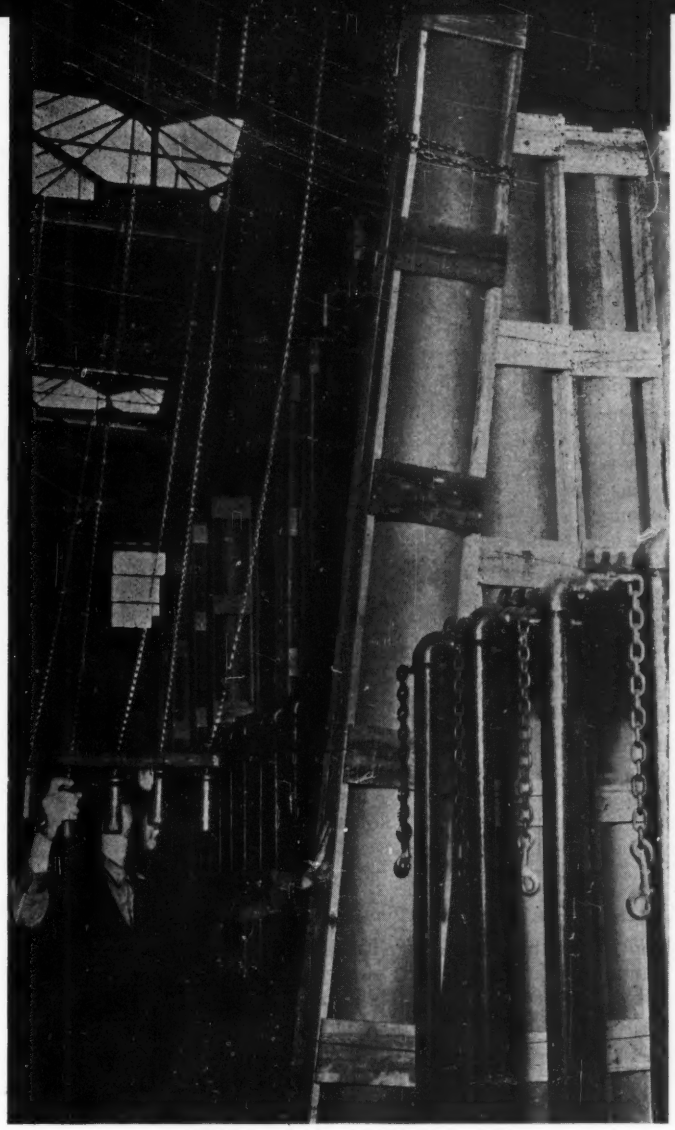
IN ADDITION to five different types of linoleum, the Armstrong Cork Company, Lancaster, Pa., produces a large volume of printed floor covering, which comes off the machines in rolls 12 feet long. These are crated, after inspection, and moved two at a time on dollies with concave beds to the storage area. Here the 12-foot-long rolls are up-ended by crane and placed vertically in the type of racks shown in the photos. The handling into and out of the racks is of particular interest. The racks, incidentally, are so spaced that there are about 14 inches of open space between the pipes, and the crates come up to 12¾ inches in outside width.

Each of the two bays in the storage area is covered by a one-ton box crane operating on a traveling beam. The long crates, placed off center on the dolly, are at an angle for convenient attachment of the chain sling. The latter is applied near the top of the crate, usually below a cleat. The pendant-controlled crane lifts the roll until it is off the dolly and suspended a few inches above the floor. The operator thus guides the load to the proper location, where he "walks" the crate into the rack.

Here the roll is stood up on the floor, adjacent to the rolls behind it, and a metal rod is then placed across the rack in front of it. The individual crates in each row are thus held securely in place by the rod laid across the notched metal strip atop the rack tubing. The hook is then lowered, and as it descends the lower end of the sling is disengaged while the loop remains attached to the hook.

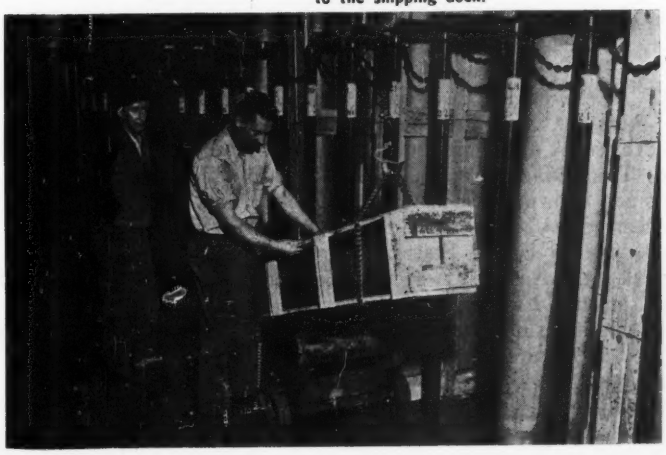
The material is removed similarly when needed for shipping. An operator atop the rack applies the chain sling, and the crane deposits the crates on the dollies for movement to the nearby shipping dock.

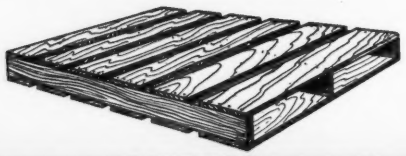
Thus, despite their awkward shape, the long and bulky rolls are handled easily in narrow space by use of the crane and dolly combination.



Long lengths in narrow space: 4-yard-long crated roll is being placed by crane in rack only 14 inches wide.

Pendant-controlled crane is lowering crate on dolly for movement to the shipping dock.



ON THE  PALLET

NEWS · VIEWS · TRENDS

IN PHILADELPHIA, during December, a group of over 50 specialists in material handling at a second dinner meeting united to form a permanent organization. By interchange of ideas and close personal contact they propose to advance the application of sound material handling practice for the mutual benefit of all concerned. Skillful co-ordination, aided by mechanization, is held to be the key to increased productivity of labor, presently at low ebb, and now aggravated by actual labor shortages in many lines.

Temporary officers were nominated as follows: Chairman, J. B. McGinn (American Viscose Corp.); Secretary, C. F. Gross (The Philco Corp.); By-Laws, Wm. Kelley (J. A. Roebling's Sons Co.); Membership, R. G. Benker (General Electric Co.); Program, H. B. Hanford (E. G. Budd Mfg. Co.).

It is proposed to hold meetings each month throughout 1947, with lively, instructive programs demonstrating the latest developments in this field. Membership is open to all interested in the problems of material handling.

* * * *

THE Industrial Packaging Engineers Association announces the organization of its first annual "Protective Packaging Contest." This contest will be held in conjunction with I.P.E.A.A.'s Second Annual Industrial Packaging and Materials Handling Exposition scheduled for April 29 through May 1, 1947 at the Sherman Hotel, Chicago, Illinois. There will be three cash awards in connection with the contest. The first prize will be a blue ribbon award and $100; the second prize a red ribbon award and $50; and the third prize a white ribbon award and $25.

R. F. Weber of International Harvester Company and President of the Association, in announcing this event stated, "This is the first time that a Protective Packaging Contest has been held. Its purpose is to inspire interest in the development and improvement of packaging materials and the technique of their application." These contests will be a regular part of the Annual Packaging and Materials Handling Exposition.

* * * *

W. H. ANDERSON Company, law book publishers of Cincinnati, Ohio, announces the publication this week of the first book on the new trade-mark act, "Trade-Mark Act of 1946", by H. A. Toulmin, Jr. This act, known as the Lanham Act, is the first comprehensive law enacted for the protection of trademarks in the United States. It was advocated for years by the National Association of Manufacturers, Association of National Advertisers, Inc., and the patent committees of various bar associations. One of the most vital features of the new trade-mark law is that after a period of years a mark becomes incontestable and is the property without question of the owner. Heretofore, the registration of a trade mark was only evidence of a claim to the mark.

* * * *

AS THE year ended, Westinghouse disclosed the start of engineering work on four of the world's most powerful single alternating current electric motors for the irrigation project at Grand Coulee Dam in the state of Washington. Each as big as a six-room house, the motors will have a rating of 65,000 horsepower—as powerful as 10 of the mightiest locomotives.

Completely dwarfing anything attempted along this line, the completed motors will each weigh 325 tons, with the rotor, or rotating part, alone tipping the scales at 172 tons. Teamed with giant pumps, each motor will force 607,000 gallons of water a minute through an 850-foot-long tunnel leading to a reservoir. Each motor will move enough water to supply the requirements of a city the size of New York.

* * * *

WILLIAM B. GOLD, Purchasing Agent, The Electric Storage Battery Company, Philadelphia, died suddenly on December 15th. Mr. Gold was 66 years old. He entered the employ of the Company in 1900 and in 1913 became purchasing agent.

* * * *

SEEKING to hasten the tremendous job of reconversion to a peacetime economy, scientists and engineers turned their talents during 1946 toward consolidating the knowledge gained during the war and putting it to work to increase the flow of sorely needed industrial and consumer goods.

The extent of their success in one important segment of industry is indicated in the annual research and engineering review of the Westinghouse Electric Corporation. Dollar volume of Westinghouse production, the review stated, was the best in the company's peacetime history and amounted to roughly double that of 1938, despite critical material shortages and a four-month-long strike at the beginning of the year.

To achieve this result, according to M. W. Smith, Westinghouse vice president in charge of engineering and research, considerable engineering went into such things as the reorganization of plant layout, designing new production lines and even complete factories where new and more efficient methods of manufacturing could be put into effect.

* * * *

IN A PAPER presented at the annual meeting of the American Association of State Highway Officials in Los Angeles recently, Prof. John S. Worley, author, engineer and analyst of highway problems,

(Turn to page 48)

Reduces Handling Costs!

By using the *Acme Uni-Pak* method, packages, semi-finished parts, or finished products are shipped and handled in one unit. The use of *Acme Steelstrapping* alone or in combination with a skid or pallet makes this method possible. Acme Uni-Pak lowers handling costs for you and your customers and increases shipping protection.

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FOUND— *Two Acres*

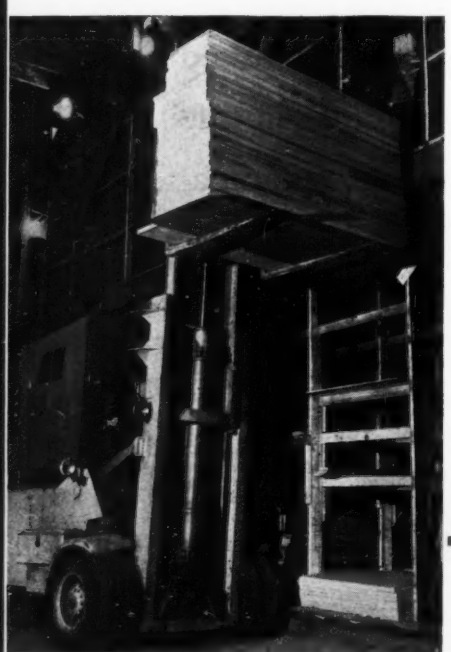
From car to stacks: better practice, flexible equipment gave the yard two extra acres.

The mechanization project of this lumber yard is not quite complete, but the operating improvements already show remarkable advances in (a) greater efficiency, (b) manhours saved, (c) acreage gained through better practice, (d) speedier deliveries and (e) less handling in mill operations.

THE Forest City Material Company, one of Cleveland's leading retail and wholesale lumber yards, adopted the unit package method of handling only four months ago, but already the firm's Plant Manager N. Shafran "can't see how we managed to handle lumber before we purchased our present fork and straddle trucks. The less time spent in handling," he added, "the lower the handling cost—and that means a stronger competitive position."

The mechanical handling program is of too recent origin to be complete in all its phases, and hence this account gains from the added interest of before-and-after descriptions as well as special problems that must be considered in the change-over period.

Load unit of doors going up to mezzanine, instead of oldfashioned door-by-door method.



Today's Method Antiquates the "Last Word" of Yesterday

The company's West Side plant, subject of this article, covers nine acres. The larger (eastern) part is used for outside storage of building stock. The covered sheds for finished material are located in the western portion of the grounds. Only a few years ago the general layout was considered the last word from the point of view of economy and efficiency—for manual operations. For example, the sheds are located on either side of a railroad spur, permitting the lumber to be handled (piece by piece) directly from the box cars to the bins. A spur about 900 feet long runs alongside the outside stockpiles on the east.

With manual operations, the lumber was hauled from the cars chiefly by over-the-road trucks. This meant that every board had to be handled three times. 1. To the transfer trucks. 2. To the stockpiles. 3. To the outbound delivery vehicles.

But when your volume has grown to be between 20,000,000 and 25,000,000 board feet per year—in addition to a considerable volume of roofing, doors, glass, plywood and other specialty items—then piece-by-piece handling soon appears costly and antiquated. Moreover, the company expects its present volume to grow in keeping with the current expansion of building construction activity. Management's conclusion was therefore: *mechanize for economical handling so that we may sell our products economically.* The greater handling capacity was amply provided with the acquisition of the fork trucks and the straddle trucks shown on these pages, plus layout changes.

Finding Two Extra Acres

First off, the layout of the stockpiles in the yard was changed. For power handling, the bin bottoms were removed as old piles were used up. Since the fork trucks had to drive into these areas, the ground was leveled and filled with crushed stone in order to provide a solid

surface. Blocks, spaced approximately eight feet apart, were put on the ground for clearance of the truck forks. The 24-foot alleys between piles remained as before. Since these relatively simple changes were made gradually, the personnel had ample opportunity to learn how to operate the new equipment with some degree of efficiency.

The board-by-board unloading of only a few months ago already seems like a practice belonging to another era remote in time. For the powered equipment moves and stacks the lumber in unit packages averaging approximately 2,400 board feet each. The bolsters are set up alongside the cars, and the packages, about four feet high and four feet wide, are then whisked away by the straddle truck to the stockpiles. The bolsters, incidentally, are 53"-long pieces of 4x6 lumber with four-inch legs, the latter set in eight inches from the ends to accommodate the lifting mechanism of the straddle truck. Its maximum run to any location is about 1,000 feet. Deposited at the stockpiles, the packages are stacked three high by the fork truck, or about 14 feet to the top of the load including the separators. A higher lift, already ordered, will permit the loads to be tiered four high.

What does the saving in time amount to? Formerly it required an average of 2½ days to unload a boxcar. With power handling, the same amount of material is handled in an 8-hour day, and the workers are not tired out. The manhours gained are urgently needed for handling today's greater volume. Too, the men are now enabled to maintain the regular clean-up schedule.

Straddle truck delivers about 2,000 bd. ft. to molding machine — within operator's reach.

This is vitally important in a lumber yard since accumulations of rubbish are fire hazards. The management has also chalked up another advantage of no small proportions. The use of the four gasoline transfer trucks—with capacities ranging from 1½ to five tons—has been practically done away with. Only one of these is now employed on a part-time basis for incidental jobs.

The amount of yard space saved borders on the spectacular. This point was summed up by Yard Foreman Art Graf, thus: "Now space is not wasted because it is no longer necessary to stack 8-foot lumber in 20-foot spaces—something we couldn't avoid before because we lacked flexibility."

The spur, it will be remembered, flanks the outside storage area on the east side for a distance of 900 feet. In the old days, the object was to spot incoming cars where that particular material was already piled. When this practice was not observed, an excessive amount of hauling by yard truck resulted. Another limitation was that the bulky vehicles could not enter certain areas.

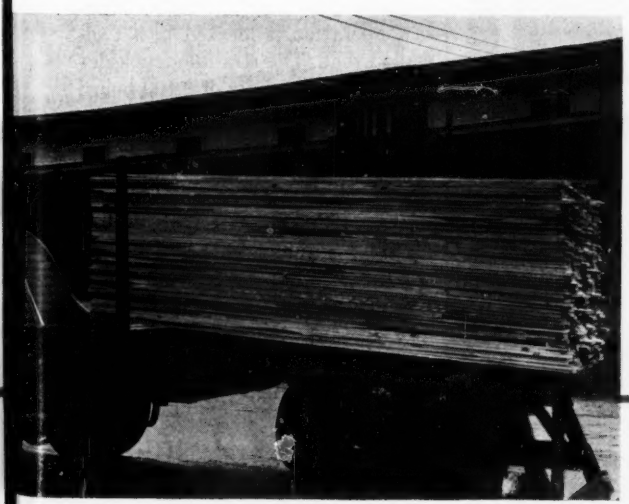
Now, however, even the most out-of-the-way places are readily utilized. Any number of cars on the track can be worked and the stockpiles can be built anywhere. The straddle truck, not tied down by any particular car, can serve them all. This, in turn, means that valuable track space can be kept clear at all times, whereas formerly a space was practically useless once a hand-stacked pile was built. The management estimates that the resultant space gain has been "at least" two acres. Nothing more need be said about the value of finding two extra acres on your own premises.

The speedier unloading has also meant a dollar-saving in demurrage bills. This is by no means an insignificant amount in a plant receiving approximately 70 carlots monthly.

Handling in Shed

Of course, the fork and straddle trucks are kept busy with numerous tasks besides car unloading and stacking in the yard. They speed the loading of the company's delivery vehicles, serve mill operations, streamline certain operations in connection with the sheds, in addition to handling a variety of miscellaneous specialty items like plywood, glass, etc.

The main shed is 500 feet long with a 20-foot ceiling and a 20-foot-wide alley in the center. It is laid out in 14-foot bins (to either side of the alley) which are 20 feet deep. The balconied west section is



Loading delivery vehicle: horse is 6" lower than truck bed, allows for sagging springs.

used for storage of doors. At present the lumber (finished trim) is handled into the bins through wall openings directly from the boxcars (across a 6-foot clearance between car and wall). The roofed shed on the other side of the track is separated from the cars by a cindered 20-foot alley which is bridged by roller sections during unloading.

As in any other lumber retail yard, a good deal of the inside trim is sold in small quantities, and hence it must be handled in the same manner. For that reason the shed operations will not be converted 100 per cent to power handling. The exception will be regular building stock, under 14 feet long, which is sold in large enough quantities to justify the unit package method. For this purpose, some of the bin floors will likewise be levelled and filled with crushed stone, enabling the fork truck to drive in for tiering and removing loads.

One of the photos shows how the fork truck facilitates the handling of such an item as doors which are stored on the mezzanine deck. Previously the yard transfer truck was spotted in the alley, and one man handed the individual doors up to another handler on the balcony. Today the fork truck operator deposits the sizable loads directly on the elevated floor. The only change necessary was to cut the openings in the mezzanine partitions slightly wider in order to accommodate the length of the packages.

Extraordinary improvements have also been noted in the handling of plywood and plaster board. A popular size is 4′x8′, and it can therefore be appreciated that the former manual piece-by-piece handling was as time-consuming as it was awkward. The Forest City Material Company now receives these sheets piled for power handling. The fork truck picks off the bulky loads from the trailer bed (3,200 sq. ft. at a time) and stacks them in the bin locations. The operating advantage? A 20-ton load is now unloaded and stored in 20 minutes—and there are no tired operators. This represents a net saving of 75 per cent over the time required for the same operation with manual handling.

Glass is received in crates. The yard trucks used previously could not enter the shed where this material is stored, which required small-lot handling and considerable muscular effort. Today these crates, like the doors, are stacked on bolsters from the freight cars, and the straddle truck then delivers the load units (about 50 crates at a time) to the specific location in the shed.

Mill Operations Speeded

The mill operations have likewise benefited to no small extent from the power handling system. The re-saw operation is located in a two-walled shed. The straddle truck deposits the load units of 2,400 board feet at one end, within reach of the re-saw operator. The tail-off man, at the discharge end of the machine, places the sawed pieces on bolsters. The sawed material is again picked up in large units and thus delivered to storage.

This operation is now performed in one-third the time it required previously. The reason is that an excessive amount of handling used

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to be required, involving four to five men, with handlers loading the individual pieces on the waiting yard truck.

The molding machine, located in another building, is served similarly. The straddle truck drives in at one end of the shed and deposits the loads for the convenience of the operator. The cut material is likewise placed on bolsters. It requires relatively little of the straddle truck operator's time to handle the loads to and from both milling operations.

Note: The main layout requirement in connection with the mill operations was to provide access for the straddle truck at the feed and take-away stations. This is usually done either with open-end sheds or larger doors, depending on the type of building available.

Streamlined Deliveries

The loading practice of the company's delivery vehicles during the present change-over period is particularly instructive in that it illustrates how a little common sense goes a long way in adapting present equipment to new methods. In this yard the company operates 13 delivery trucks, which have roller beds and dump-type bodies. The permanent name plate on either side extends about half the length of the body, and three stake pockets are on each side of the rear half. To load these vehicles with the new fork truck the company should—theoretically—have flat-bed vehicles with removable panels at the sides. Here is how the company uses its fork trucks and the present delivery vehicles.

For loading, a horse made of 4x 6's is placed back of the outbound vehicle, and the fork truck deposits the load unit so that it rests on the truck bed and on the horse, as shown in one of the photos. The vehicle then backs up, and the load rolls over the three rollers into the desired position. (A few turns of a crank may be necessary to move the load the last two or three inches.)

Until the company is ready to replace its delivery fleet with new flat-bed trailers so that the loads can be placed directly on them by fork truck, the present change-over method is doing very nicely. It has contributed importantly to the over-all improvement record of greater economy and efficiency. Unit package loading (instead of the board-by-board method) has increased the daily average delivery trips per vehicle from three up to five deliveries. "It will be better than that when the whole yard is changed over to the new method," said Manager Shafran.

In fact, power handling will make possible a complete revamping of the entire order assembly method. An area is now being cleared for that purpose. The packages of 2,400 board feet will here be placed on horses by the fork truck—in advance of the delivery date. The back horse will be a conventional type, whereas the one at the front end will be a simple two-legged stand, braced and made of 4x6's. This stand, approximately four feet high and five feet long, will be three feet in from the end of the load. For loading, the delivery truck will back up against the elevated package, knocking down the stand at the front end and thus depositing the lumber on the truck bed. As the truck continues to back up, the material is again advanced

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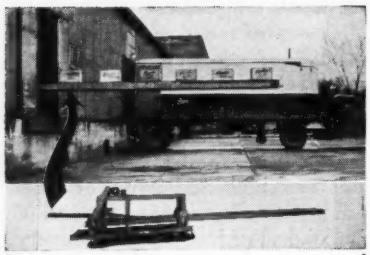

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over the rollers, thus completing the operation. Thus power handling is making possible advance order assembly—another important change.

You can see that the mechanized operation has numerous ramifications—some not evident from observation of the physical handling procedures themselves. In addition to the remarkable improvements in time, efficiency and cost, must be added such items as better housekeeping, and "finding" two extra acres in the yard area.

In view of the foregoing facts, Manager Shafran's observation, "I don't see how we did it before" has gained considerably in significance. And the entire yard will not have been converted for another two or three months!

P. S. The company is now planning to take over another lumber yard which, due to the success of the operation at the West Side plant, will be completely laid out for mechanical handling. For the same reason, the firm's East Side yard is also being converted as rapidly as possible to modern methods.

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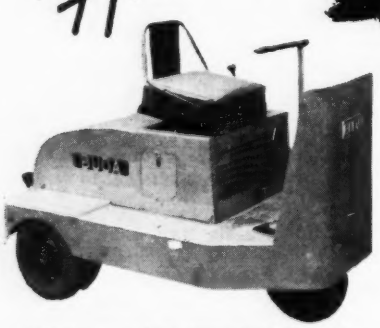

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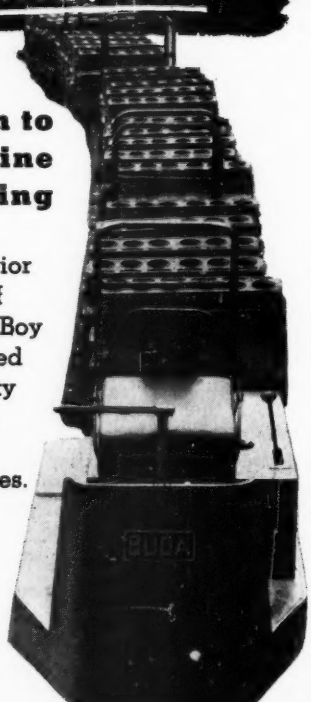

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A Seller Looks at the Field

By E. M. ABRAMSON
Ohio Equipment Co., Inc., Cleveland, O.

TOP Management is beginning to appreciate the value of modern material handling; management has come to realize that, through the more efficient ways of moving and handling of materials, the cost entering into the product, from the state of raw stock to finished product, can be greatly reduced; in fact, so much so that it does not hurt, as in the past, to pay the trucker the 90c to $1.00 per hour that such labor is receiving today.

Yes, management is concerning itself at this time with the handling operation in the plants. As should have been done a long time ago, a new department is being set up in charge of a man, or group of men, familiar with modern handling practices. The movement of material is supervised from point of receipt of raw stock to finished product, and the costs entering into the movement and handling operations are recorded. Management is beginning to realize what the material handling costs are and, not as in the past, charging this item to indirect labor and overhead.

Proof that management is giving this subject thought and attention today: equipment sellers have more demand for material handling equipment than there is in the way of supply. Also, management is calling increasingly for assistance in the solution of handling problems. Plant surveys are also being requested more and more. And moving pictures, showing the application and use of up-to-date handling equipment, are being requested. Consulting engineers, who specialize in plant layout and material handling, are more in demand than they ever have been. Publications devoted to the business of material handling are doing a bigger and better job of keeping management informed as to the new things which industry is doing, as well as the new types of handling equipment that are and have been developed.

Greatest Saving in Handling

There is no place in industry today where as great a saving can be accomplished as in the operation involving material movement. While there are still many companies that have not considered their material handling costs, it can be readily assumed that where pick-up-and-set-down handling is used, through catch as catch can methods, such companies will not long be able to keep up with their competition. Progressive companies have placed their material handling operations on the scientific basis of handling cost knowledge.

Management, if it has not already done so, would do well to analyze material handling methods and set up within the organization a department to lay out a material handling system. Such a department will arrange for the most efficient handling methods.

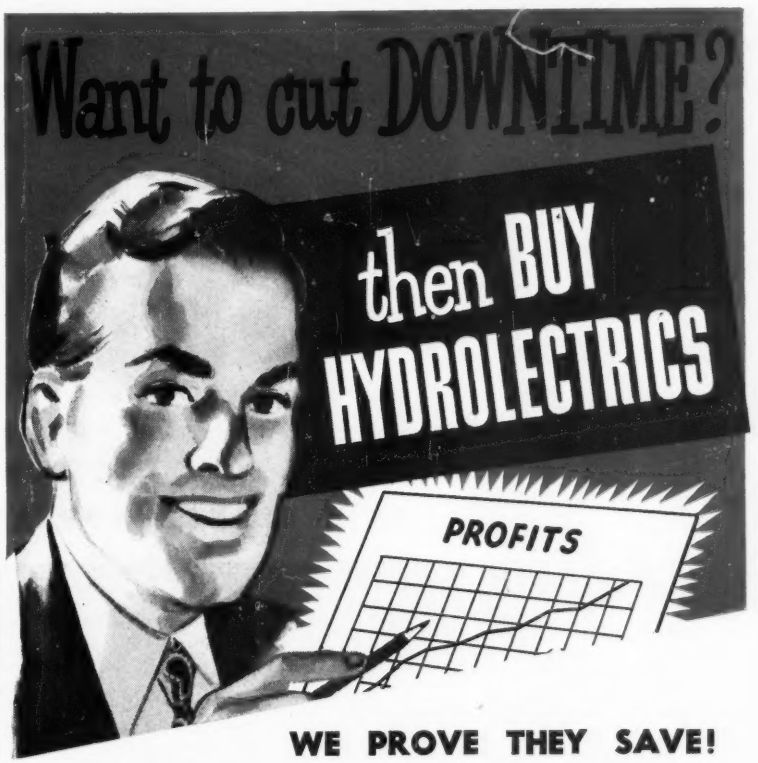
From time to time we find companies which are still side-stepping any discussion that has to do with their handling operations. They use, as an excuse, either that their handling costs are not important, or that the cost of the present up-to-date mechanized handling equipment is too great for their consideration. If such company representatives really knew what their handling costs were, they would have some very sleepless nights. Further, they would understand that they are paying for the new mechanized handling equipment every day, without having the benefit of its service and economies.

Other companies continue to state that up-to-date handling equipment is all right for the large companies and not for the small. Some of the large companies say that this mechanized handling equipment is fine for the small companies but not for the large.

The material handling equipment industry today is set up to assist management in many ways in the solution of handling problems confronting industry. Practically all handling equipment manufacturers have trained material handling engineers, whose services and experience are freely available.

A CORRECTION

Service Caster & Truck Corp. announces that, through error, price was quoted in the December advertisement in Flow featuring its Service Liftable. Due to material scarcities and price fluctuations, Service Liftable quotations are on a current basis through the home office in Albion, Michigan, or its representatives in all principal cities.



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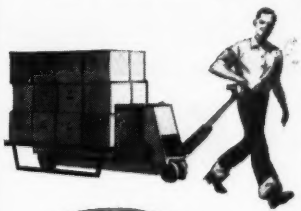

From the smooth, easy-steering dual front wheels to the alloy gear transmission, every part of the Hydro*Lectric* is designed and built to give constant service. Spiral, bevel and spur gears, all ball bearing mounted, develop the power necessary to move 2-ton loads with effortless ease. The transmission case is fully sealed against abrasives and other foreign matter.

Let us show you how the Hydro*Lectric* can do your job better. Write to Mr. W. C. Stuebing for Folder "L".

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LIFT TRUCKS, INC.
Walter Stuebing, *President*
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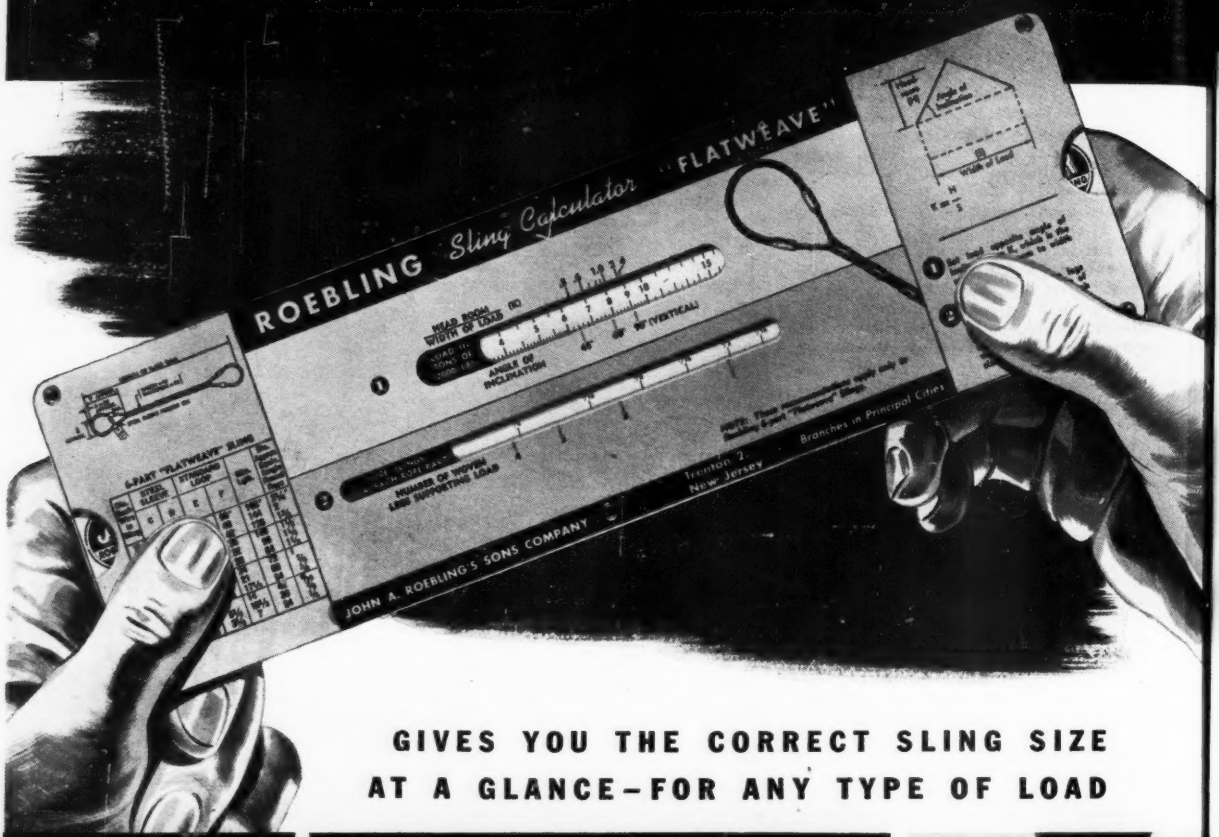
SLING FACTS AT



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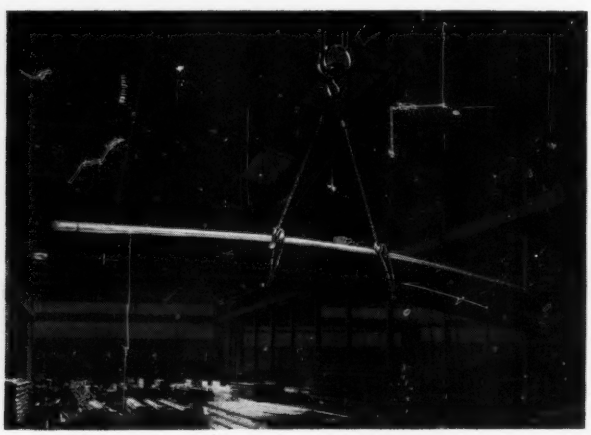

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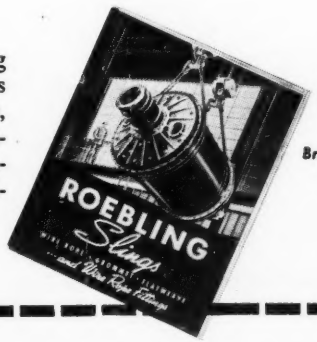
Ask for a copy of the Roebling Sling Catalog A899, too. It is the complete story of the design, construction and use of Flatweave, Round Rope and Grommet slings plus many special-purpose types.



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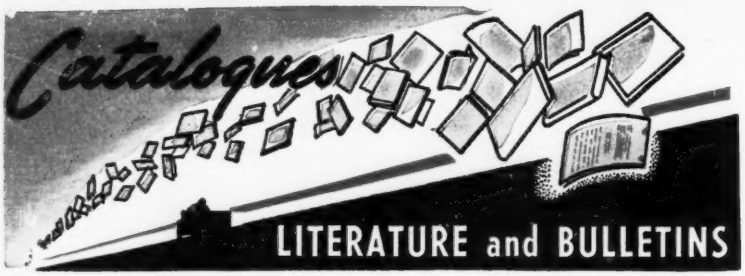

The publications featured on these pages were written by experts. They are FREE publications. To obtain these use the postcard bound into this issue.

276—Wheel and Roller Conveyors . . . "Easy-flow" principles of material handling in production and warehousing are illustrated in this folder by the Metzgar Co. In addition to gravity equipment, the publication also covers powered portable conveyors as well as accessories.

277—Hinged Conveyor Sections . . . Currently available is a two-page bulletin, issued by the Rapids-Standard Co., on its gravity wheel conveyor hinged section and spur curve. Complete descriptions, with photos, are given on installation and specifications of each device. The hinged section is designed to permit passage through a line of conveyor without removal of sections; the spur curve is used to facilitate sorting and rerouting of products to a spur in the conveyor line.

278—Sched-U-Graph . . . How to get maximum production from existing plant facilities is the theme of a 32-page, full-color booklet published by Remington Rand, Inc. It describes Sched-U-Graph, a practical chart-board application of the time-control principles pioneered by Henry L. Gantt. A feature of the device is that it combines essential record data with graphic interpretation. Example of subjects covered: loading and scheduling of machines, men, work centers; part orders and operations; scheduling of production and sub-assemblies; inventory control of parts for line assembly, etc.

279—Hooker's Computer . . . A pocket-size computer, designed to give hookers an accurate method of determining the maximum safe load that a sling chain can lift at any angle, has just been produced by the S. G. Taylor Chain Co., Hammond, Ind. It is printed on plastic that can be kept clean for easy reading.

280—Protective Clothing . . . A new 10-page booklet on its line of industrial protective clothing has just been published by the B. F. Goodrich Company. The booklet tells of the new products in this field which the company has introduced in recent months, pictures each garment, describes its functions in industry, and relates the method of construction and materials used to guarantee maximum service.

281—Wire Cloth & Metallic Screen . . . The Cambridge Wire Cloth Co. announces a 32-page stock list of wire cloth and metallic screen. Listed are many "hard to get" items of steel, galvanized, brass, bronze, copper, everdur, inconel, monel metal, nichrome, nickel, and the various stainless steel analyses. According to the company, the stock list is unabridged.

282—Unitized Assembly . . . A profusely illustrated folder by the Island Equipment Co. featuring an "All-Purpose Conveyor" as a mechanized work table for assembly, inspection and packing operations. The system is called "Unitized Assembly" or "Production Line Unitable." Operational photos show the equipment at work in a carpet sweeper assembly plant, the packaging department of a bakery, a drug plant, etc. Other photos and illustrations show cross-sections and parts of the equipment.

283—Filter Systems . . . A 16-page presentation by the Niagara Filter Corp. It tells how apple honey and wine were filtered the same day in the same filter, how candy scrap was upgraded to a bland neutral syrup, how the Navy got more "smoke screens", how blood albumen was filtered and clarified. These and other case histories describe the application of Niagara filter systems in the chemical, food, fermentation and process industries.

284—Tractor Crane . . . A 4-page illustrated bulletin showing the "Go-Devil" tractor crane in use. A chart gives the specifications along with a detail drawing of the various boom arcs and elevations. Issued by Drott Manufacturing Corp.

285—Strapping Equipment . . . The Stanley Works presents a 14-page catalogue on different types of strapping devices, corner protectors, staples, steel band and portable carriers. Banding tools and corrugated fasteners are also shown. A section is devoted to car banding tools and accessories, also to box-fasteners.

OPPORTUNITIES

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Rates: for "Positions Wanted" $3.50 minimum, limit 25 words. For all other classifications $3.50 minimum for 25 words, each additional word 10c; boldface type or all capitals, $6.00 minimum for 25 words, each additional word 15c; limit 50 words. Box addresses count as five words. All insertions are payable in advance.

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MATERIALS HANDLING ASSIGNment—by mature man with sales engineering background including storage engineering, and five years in supervision Methods Engineering and Stores. Prefer long-term position, will consider short assignments. Box 1347, FLOW.

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Manufacturers' Representative
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Well Rated Leading New York Material Handling firm seeks line of power driven fork trucks. We cover all of New England and have 22 hard hitting sales engineers. Have our own warehousing and service facilities. Inquiries invited. Box 1247, Flow.

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DISTRIBUTORS AND REPRESENTATIVES WANTED FOR COMPLETE LINE OF MATERIALS HANDLING EQUIPMENT — FLOOR TRUCKS, PACKAGE TRUCKS, GRAVITY ROLLER CONVEYORS, BELT CONVEYORS, MONORAIL SYSTEMS, ETC. WRITE TO SPEEDLINE EQUIPMENT MFG. CORP.,528 EAST 119th STREET, NEW YORK 35 N. Y., TELEPHONE ATwater 9-8000.

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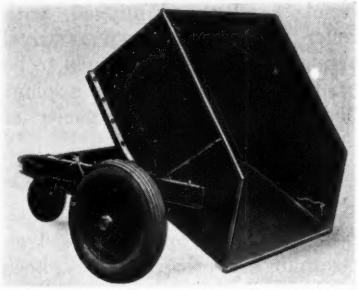
Acute heart ailment forcing owner to sell profitable going Pallet Business, located Eastern Connecticut, netting $1,125.00 weekly. Land, building (100' x 30') Machinery, Equipment, Orders on hand. Good will, immediate cash sale, $18,000.00. Principals only. Write or phone—Mr. Bitgood-404-2-Danielson, Conn.

FOR SALE—One 200 ft Rapid Standard 18" Conveyor with angles and stands with 18 foot belt booster. $1200.00. Union Transfer Co., Inc., 1030 Ohio St., Terre Haute, Indiana.

For additional information on these products, write Dept. 5, Flow Magazine, 1240 Ontario St., Cleveland 13.

DUMP TRAILER TRUCK

NP1—Improvements in the design and construction of the "Phil-Dump" Trailer truck are announced by Phillips Mine and Mill Supply Company. The trailer is now completely equipped with



pneumatic tires, and an optional center caster for greater maneuverability, ease in handling, faster haulage and dumping in steel mills, foundries and all types of industrial plants. Its construction includes the roll-over type body, chain release, and quick return to normal position. Of welded steel construction throughout and equipped with Timken bearings, the "Phil-Dump" trailer is of one cubic yard capacity.

GRAIN HAND TRUCK

NP2—The Magnelux Zepyhr V grain and warehouse hand truck, made of cast magnesium alloy, weighs 49 pounds, states the manufacturer. Legs and nose are reinforced steel strongly bolted to the frame. There are 6 cross bars with a seventh optional which, when crossed by the center vertical, forms small openings. Thus packages will not drop through and the truck may be loaded almost to the top of the handles. It is said to roll smoothly, with no edges or points to catch or snag.

PORTABLE ELECTRIC HOISTS

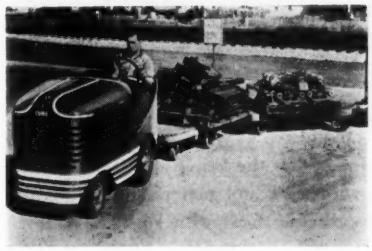
NP3—A new line of roller-chain electric hoists of ¼, ½, and one-ton capacity has just been announced by the Whiting Corporation, which utilizes a double-reduction, totally enclosed, worm-gear drive. The hoist frame is a steel casting. A patented self-energizing motor brake interlocks with the controller to provide safe operation. Upper and lower safety limit switches are provided.

The alloy steel roller chain is said to operate over an extra large sprocket, assuring smooth operation and reducing chain wear. The load hook has a universal action and swivels on ball bearings, which prevents the roller chain from twisting. Control is by means of a single-bar grip, which can be operated by one hand.

The hoist can be operated in an inverted position, an advantage where the overhead suspension point is high. Instead of carrying the hoist to the point of suspension, the cable is run out to the desired length, the hoist is turned upside down, and suspended from the hook. The load is then attached directly to the hoist.

TOWING TRACTOR

NP4—The Clark Tructractor Co. announces its new, improved Clarkat towing tractor. Among the improvements listed are a wider steering axle, either pneumatic or solid tires front and back; forged steel spindles; center pivoted sus-



pension of steering axle and center control type steering gear, operating through worm and gear sector; greater accessibility to motor and drive units; standard automotive type transmission with three speeds forward and one reverse; water pump in cooling system; mechanical governor for closer control of speeds and better carburetion; and a flattened nose to provide surface for pushing loads.

SWING TABLE

NP5—American Wheelabrator & Equipment Corp. (formerly American Foundry Equipment Company) has announced the addition of a 48" Wheelabrator Swing Table to its standard line of Tumblasts and Tables. The new machine, several of which have already been built and tested, is equipped with one 19½" by 2½" airless Wheelabrator blast cleaning unit and is designed for cleaning large, bulky, fragile work such as would normally require an airblast room.

DIE HANDLER ASSEMBLY

NP6—The Mercury Manufacturing Company announces a new die handler assembly, which is built into a Mercury "Mogul" 5-ton high lift chassis. It can also be furnished on Mercury's 3-ton chassis, in either high or low lift models.

This design consists of two power driven die movers, operating in machined slots at the sides of the load platform. Each die mover is driven by a compound wound D.C. motor through a Brad-Foote Gyro speed reducer and roller chains. Independent control is effected by two push-button-operated magnetic contactors. The push buttons are conveniently located on the operator's dash. Additional controls at the rear of the load platform may be had if desired. Independent control of the die movers makes accurate die spot-

ting a simple matter, it is stated. The die movers may be retracted into slots at the rear of the platform for skid handling.

RACK-CONVEYOR

NP7—This Rack-Conveyor, made by the Rack Engineering Co., is handling the feeding and controlled placement of the output of a bank of five gear shapers, according to the company. The contents of its Master-Trays are within arm's

length and accessible to the machine operator.

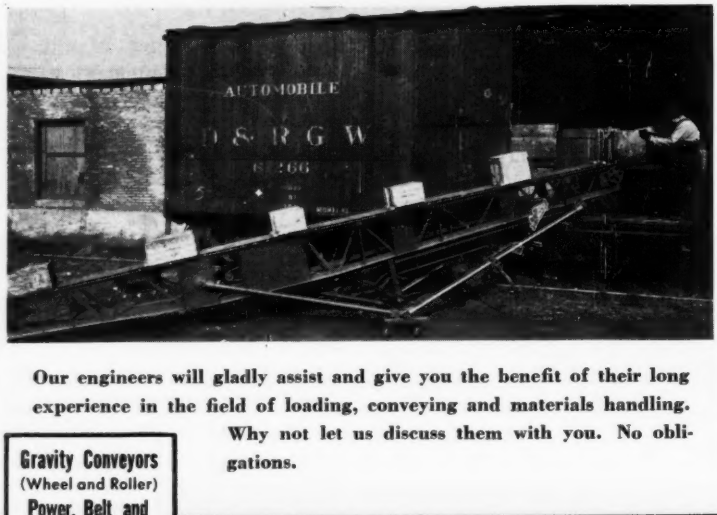
The Master-Trays hung on its uprights allow as much as 27 square feet of working surface at a cost of only 6 square feet of floor space. Because the trays are never manually handled when loaded, they may be filled to capacities of 300 pounds each. The ceiling space between the trays is easily varied to conform with the height of material handled. Equipped with roller bearing casters of a swivel arrangement, the unit is said to be easily maneuvered about a plant floor when loaded to capacity of one ton.

HOOPER PORTABLE CONVEYORS

"ACT WISE — CONVEYORIZE"

CONVEYORIZE

Hooper portable conveyors are the perfect solution to your problems of material handling. Increase your production and cut cost with HOOPER power and gravity conveyors designed to take care of a wide variety of jobs.



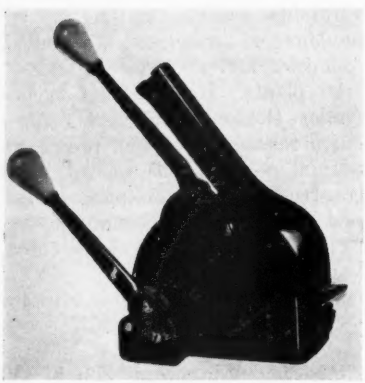
Our engineers will gladly assist and give you the benefit of their long experience in the field of loading, conveying and materials handling. Why not let us discuss them with you. No obligations.

Gravity Conveyors (Wheel and Roller)
Power, Belt and Chain Conveyors (Stationary and Portable)

J. R. HOOPER COMPANY
Engineers and Manufacturers
SOUTHVIEW AND ARTHUR BROOKFIELD, ILL.
PHONE: BROOKFIELD 1252

STEEL STRAPPING TOOL

NP8—A fast combination steel-strapping tool has recently been made available by Acme Steel Co. It is called the Acme No. 3 Steel-



strapper. Weighing only 6¾ pounds, the tool is easy to handle, either mounted or unmounted, and can be operated on a flat surface of just 5 inches, handy for narrow packages or bundles, according to the release.

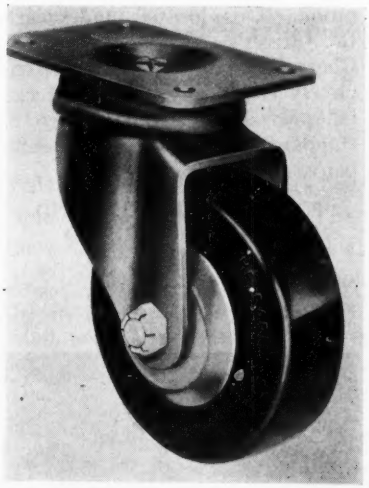
The tool has two levers, one for tensioning, another seals and cuts the strap from the coil of steel-strapping. Both levers travel in an arc—the Sealer lever travels in an arc of 110°. The speed of the tool is accounted for by the short distance these levers cover, it is stated. The sealer lever also automatically returns to the starting position after the sealing operation is completed.

The seals are automatically fed from a magazine into the sealer jaws. The magazine holds a slip of 100 seals. This new "streamliner" is made to handle ¼", ⅜", ½" x .010" to .020" sizes inclusive, both flat and tight edge strap.

A most important feature is that all wearing parts can quickly and easily be replaced on the job by the operator. For instance, the gripping dogs can be replaced in a matter of seconds, states the company.

FORMED STEEL CASTER

NP9—A new caster, the first of a formed steel No. 33 series especially designed for light and medium duty service, has been added to the



caster line of the Rapids-Standard Company, Inc. The new caster is said to incorporate liveliness in action and is designed for use on light trucks, dollies and other portable equipment. Top plate and swivel yoke are formed of 1/8" steel. A double ball race assembly provides free-swiveling action under rated load capacities.

The caster is manufactured in swivel and rigid models and may be equipped with either hard or soft tread molded-rubber Rapids Standard 3½ inch wheels. The top plate size is 2½ inches by 3⅝ inches with bolt holes for ¼ inch bolts at 1¾ inch by 2⅞ inch center to center spacing. Overall height is 4 11/16 inches.

PNEUMATIC TIRE

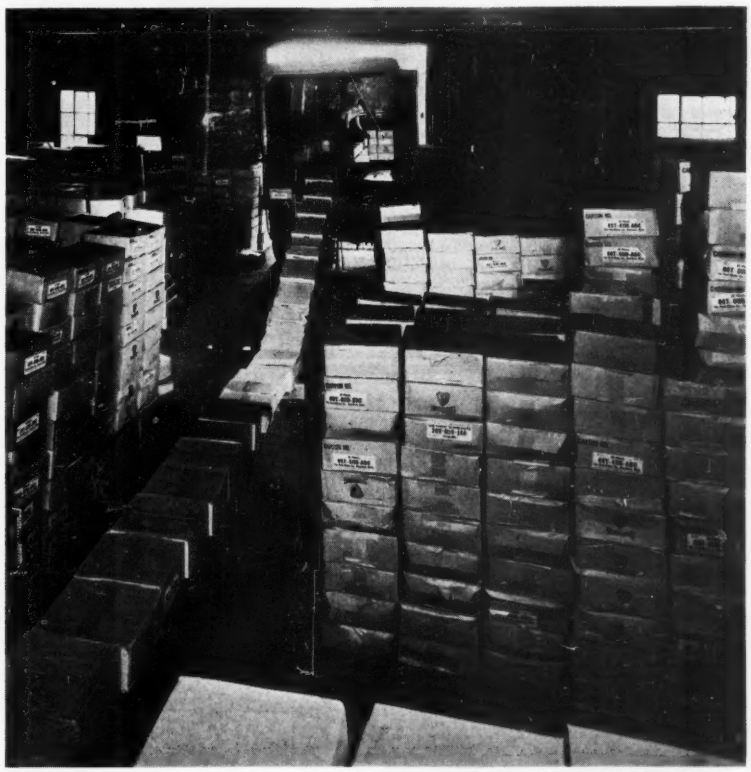
NP10—A new pneumatic tire for use on shuttle cars and other equipment used in underground mine service is announced by the B. F. Goodrich Company. The tire has been specially designed for the severe demands of mine operation, with round shoulders and extra thick sidewalls to protect it from snagging and cutting. It has two-way traction, which is essential since shuttle cars operate in both directions. The tire is at present being produced in several sizes including 7.50-15 ten-ply, the most popular size in this service. Maximum load for this tire at five miles an hour is 4340 pounds, at 10 miles 3880 and at 30 miles 2530. Two other popular mine tire sizes, 8.25-15 and 10.00-15 give a complete range for this type service, the company says.

CHORE BOY TRACTOR

NP11—The Buda Company announces the latest addition to the Chore Boy line of industrial shop trucks, the Buda Model TR Chore Boy Tractor. It is designed for towing and engineered for pick up and general hauling and towing jobs in industrial plants, warehouses, railroad freight stations, loading trucks, etc.

It has drawbar pull of 1050 lbs. and a net weight of approximately

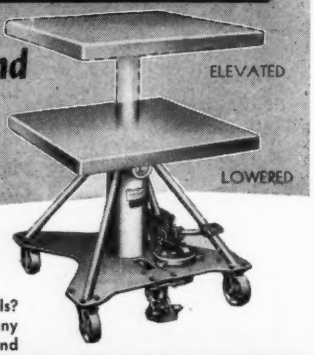
FIVE hundred cartons, each containing 50 automobile pistons, are loaded into a trailer truck at the Baker Cartage Co., Detroit, by one man in 1½ hours. The conveyor installation that makes this possible consists of a power booster coupled with sections of gravity wheel conveyor, as shown in the accompanying photos. The loading may be done either as a one-man or two-man operation. When the driver works alone, he loads the conveyor line solid. Then he goes into the trailer, turns on the booster, and stacks the cartons as they come up. To speed the loading, two men may be employed—one placing the cartons on the conveyor, the other stacking them in the trailer.



—Courtesy, The Rapids-Standard Co. Inc.

THE ANSWER
To Many LIFTING Problems

LYON-Raymond
PORTABLE
HYDRAULIC
ELEVATING
TABLE



Worried about costs? Speed? Safety? Damage? — and other factors in handling materials? Then look into these many jobs this handy Lyon-Raymond Elevating Table is designed to do.

HERE-ARE JUST 12 OF ITS USES:

1. Die handling
2. Sheet feeding
3. Adjustable section in conveyor system
4. Work table
5. Assembly bench
6. Positioning work to machine
7. Support for overhanging work
8. Adjustable test bench
9. Transfer table
10. Positioning parts for attachment
11. Welding positioner
12. Loading and unloading

We have prepared an illustrated bulletin full of suggestions that methods engineers will find most helpful. It's free! Write for your copy today!

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OLSON Conveyors
to SPEED your handling

Whether you make delicate electronic appliances, foods, or heavy machinery, an Olson Conveyor System can be designed to meet your needs. Every phase of product-moving can be accomplished automatically, from the time raw materials arrive in the plant till the finished product is delivered to the shipping platform.

WRITE FOR FREE CATALOG

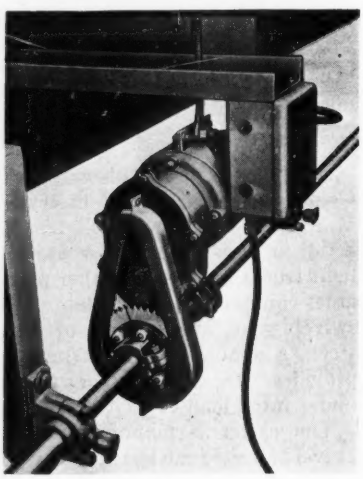
Gravity, Belt and Chain Conveyors
Subveyors—Spiral Chutes
Elevators—Hoists—Lifts

SAMUEL OLSON MFG. COMPANY, INC.
2418 Bloomingdale Rd. Chicago 47, Ill.

1300 lbs. The length over-all of the tractor is 63¾", width 37½". The driver sits on a cushioned seat and has clear vision of the whole towing operation, according to the manufacturer. Similar to all Buda Chore Boys, it is equipped with two brakes, a foot brake and an automatic brake which is applied when the driver leaves the seat. The transmission is automotive type with three speeds forward and one reverse. The clutch is of a patented cone type. The engine is 4 cycle, air-cooled, magneto ignition. It is located underneath the driver's seat. The Tractor Chore Boy body is all steel, completely electrically welded. It can be provided with all types of standard hitches, states the company.

POWER TRAVEL FOR HAND TRAVELED OVERHEAD CRANES

NP12—The Northern Travelator (patented), which proved electric



power travel for hand traveled overhead cranes, is now available in a universal mounting which is said to make it applicable to any type overhead crane, both single and double girder. Nearly every arrangement of beam and hoist to be found in hand traveled cranes can be handled with this new universal mounting, according to the company's release.

Among these are (1) top running crane with deep beam, (2) top running crane with shallow beam, or beam deeply notched into end truck, (3) top running crane with exceptionally shallow beam, (4) underhung crane with deep bridge

beam, (5) underhung crane with shallow beam, (6) double girder crane, etc.

The motor is held in a steel mounting band which is connected to the mounting bracket. This mounting band may be given any position about the periphery of the motor. As a result, the motor may be given any desired position about the axis of the squaring shaft, which it drives. The variety of positions made available permit application to nearly all types of hoist cranes, it is stated.

ALUMINUM-WHEELED HAND TRUCK

NP13—A new general service hand truck is announced by the Thermoid Company. It is 53 inches high by 18 inches wide with 9-inch wheels. It is made of rugged aluminum alloy castings with a steel nose. The manufacturer points out that the ease of operation results from four features: *light* weight of structural materials, perfect balance, a long 7-inch steel nose that makes "breaking" a load easier, and solid rubber-tired, easy rolling ball bearing wheels. The tires are solid and cut resistant. The manufacturer also states that

heavy-duty ball bearings have built-in grease seals that prevent grease leakage from a large built-in grease reservoir.

Public Merchandise Warehouse vs. Private Branch Warehouse

By WILSON V. LITTLE

Executive Secretary
American Warehousemen's Association,
Merchandise Division

A MANUFACTURER who has not yet used public merchandise warehouses in his marketing processes may say: "The public warehouseman appears to be able to do everything that I require, but can't I establish and maintain my own branch storeroom and sales organization in Chicago, say, at less cost than what the warehouseman would charge me?" The fact that thousands of manufacturers do not open branch storerooms in Chicago or anywhere else, or have given up such storerooms in the past and are taking advantage of the distribution services of public merchandise warehouses in their various markets, is in itself a sufficient answer to that question in most cases.

In establishing a branch stockroom, the manufacturer undertakes a heavy initial investment for ownership of the property or incurs a burdensome expense for rental of it and for the maintenance of it in such overhead items as office and handling equipment, salaries of employees, workmen's compensation insurance, light, heat, power, watch service, repairs, etc. This overhead cost is approximately the same whether the

SAMSON SKID LIFT TRUCK

A QUALITY PRODUCT AT A MODERATE PRICE

WELL DESIGNED
CORRECTLY MADE
MODERATELY PRICED
GOOD DELIVERY

CAN BE MOTORIZED WHEN GEARED HEAD MOTORS ARE AVAILABLE

- MOVING DIES TO PRESS, BENCH, STORAGE
- LEVELING MATERIAL FOR PROCESSING
- RAISING LOADED SKIDS TO BENCH LEVEL
- HANDLING STORAGE BATTERIES
- ELEVATING FRONT ENDS LIGHT AUTOMOBILES
- ELEVATING DRUMS FOR EMPTYING
- PORTABLE ASSEMBLING OF SMALL MACHINES
- ALMOST UNLIMITED APPLICATION TO INDUSTRY

BRIEF SPECIFICATIONS (Standard)

CAPACITY, LBS.	1500
ELEVATING TABLE SIZE	24x43¼
ELEVATION ABOVE FLOOR	33"
LOWERED HEIGHT	7"

BALL BEARINGS ON WORM & LIFT SHAFTS
COMPLETE DATA ON REQUEST
Capacities of 1000 & 2000 lbs. available as are widths of 20" & 30" for any model, at extra cost.

GSE

GENERAL SALES & ENGINEERING COMPANY
7358 N. CLARK ST., CHICAGO 26, ILLINOIS

HARDWOOD – STEEL – ALUMINUM

HARDWOOD–STEEL–ALUMINUM

Let Us Supply You

with

THE RIGHT PALLET

for your job

at the *Right* Place — at the *Right* Time

Pallets Made of Hardwood — Steel Aluminum

MAGNESIUM ALLOY DOCKBOARDS
L C L PALLET BOXES

Learn the economy of a rental program for the entire materials handling system and how it can be arranged.

Mill connections in Ohio, Pennsylvania, New York, Virginia, Georgia and Arkansas.

HARDWOOD–STEEL–ALUMINUM

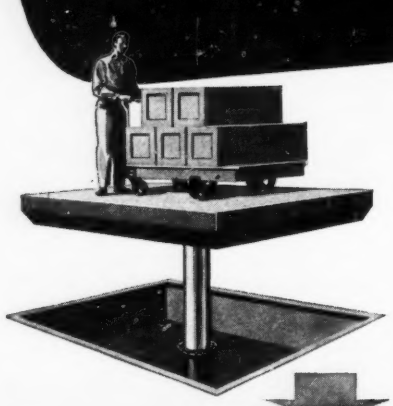
WIRE OR WRITE FOR FURTHER INFORMATION

PALLET SYSTEMS, INC.

GUARDIAN BUILDING
CLEVELAND 14, OHIO

NEW LIFTING EQUIPMENT

Uses Economical Oildraulic Power



Use Oildraulic power to lift loads directly from plant floor to trucks, freight cars or different building levels. Rotary Levelators speed plant traffic, conserve manpower, cut costs. Save plant space, too . . . no need for ramps. Plant floor can be poured at grade. Safe, dependable, economical. Installation simple and inexpensive. For complete data, write for Catalog RE-201.

ROTARY LIFT CO.
1050 Kansas
Memphis (2), Tenn.

Rotary LEVELATORS

stockroom is kept full all the time or only part full, and whether the payroll happens to be busy or loafing. Each month there is that fixed expense that is determined mainly by peak requirements and that persists during seasonal reductions in sales volume.

When a manufacturer places a stock of his products in a public merchandise warehouse, the warehouseman charges only for the number of packages or units stored and only for the work done in connection with them. If a hundred units are in the warehouse, the services performed in connection with only those hundred units are the services charged for. In his own branch storeroom, a manufacturer might have room to accommodate a thousand or more units, yet have actually only a hundred units on hand. His overhead expense in operating this branch is fixed, so that his cost for his own warehousing of the hundred units is the same as for a thousand. It is only when using the services of public merchandise warehouses that manufacturers can be assured that the over-all expense of maintaining stocks will be in direct ratio to seasonal or other fluctuating requirements.

Press-time for this issue of FLOW was during the FIRST National Material Handling Exposition, and hence only a short advance report could be included in this issue. A more detailed and complete report will therefore appear in March.

A branch storeroom is generally a source of worry and expense to a manufacturer out of all proportion to its value. The local sales representative would probably be in charge of it, and a great amount of his time would be spent in supervising its activities. He gets bound up in administrative routine and detail, thus handicapping him greatly in his sales effort—his real function and probable forte. When the goods are in a public merchandise warehouse and the warehouseman attends to all the physical distribution detail, the sales representative can devote all his time and energy to selling. Anything that reduces his opportunity for sales effort produces nothing but lost sales for the manufacturer who employs him and, conversely, public warehousing leads to more sales.

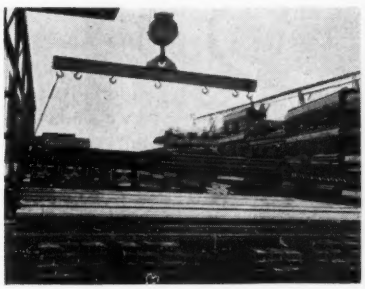
It does happen, of course, that some manufacturers have complicated lines of merchandise involving a great many numbers, or their products may be highly technical, or the filling of orders may require an unusual amount of breaking of packages and retail deliveries. The volume may be sufficient to warrant the manufacturer's maintaining his own personnel to fill orders, keep account of stock, etc. In such cases, it is advantageous for the manufacturer to lease space in a public merchandise warehouse for his minimum requirements and for him to operate it as his own branch storeroom. Even though the area leased may be small, it has the benefit of the railroad sidetrack and other traffic facilities that attach to the warehouse plant. More-

over, the warehouseman is in a position temporarily to increase the area when seasonal need for more space arises. Besides, the insurance rate on the goods is likely to be much less than in other buildings because most public warehouse plants are designedly of fire-resistive construction and are given comparatively low rates by underwriters on goods stored. Private storerooms without railroad trackage would necessitate cartage of the goods to the storeroom if received in carloads, and would probably be impractical because of the cartage cost.

The role that public merchandise warehouses perform in economical and efficient distribution has long been recognized by the U. S. Department of Commerce, by the Chamber of Commerce of the United States, by economists and marketing research agencies, and especially by the thousands of manufacturers and other producers who make use of them in their markets in all parts of the country. The foresighted manufacturer when entering a new market not only investigates the prospective demand for his products there, but at the same time he acquaints himself with the facilities and versatile service that the public merchandise warehouses in that market provide for enabling him to develop his sales volume there and to make deliveries to his customers with the greatest convenience and at the least expense to him.—*From an address before the Industrial Marketing Discussion Group, Chicago Chapter, American Marketing Association, Dec. 3. 1946.*

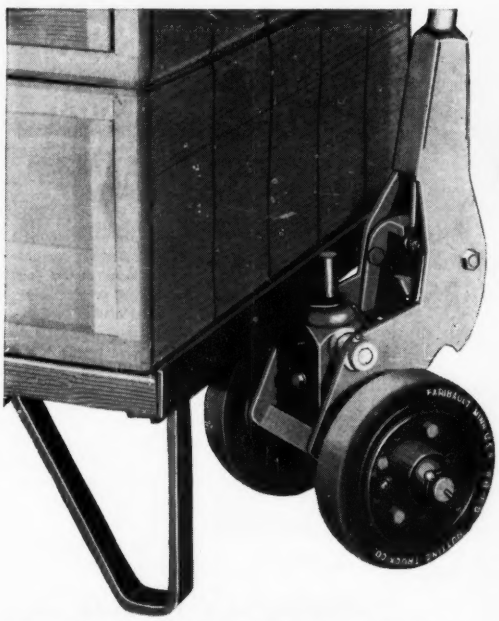
Crisscross Pattern for Cubage

The accompanying photos illustrate effective use of overhead space by stacking oblong structural shapes in a crisscross pattern instead of on 4 x 4 dunnage. These structural members, by the way, will be fabri-



cated into track shoes for crawler-type tractors. The first photo shows the piling of the 6,000-pound bundles in the crane runway by use of a spreader bar. The bundles vary in length from 12 to 18 feet, and it can be seen that the spreader bar has vari-spaced hooks for bundles of different lengths. Note that the bundles in alternate layers extend beyond the pile. The projections permit removal of the sling cables when the bundles are stacked, or attachment of the sling when the lifts are removed for fabricating purposes. By use of the crisscross pattern the bundles are piled nine high, instead of only seven high, which was the case

when wood dunnage was used between layers. The second photo shows how the former use of seven layers of 4" x 4" dunnage required 28 inches of vertical space. The criss-crossed bundles make neater, safer, and more compact stockpiles.—Courtesy International Harvester Co., Industrial Power Division, Tractor Works.



Nutting JACK AND LIVE SKIDS

FOR FLEXIBLE LOW COST MATERIALS HANDLING

Only the Nutting Jack is operated by gravity and leverage—no springs to break!—no danger of your jack-skid system suddenly bogging down. The Nutting Jack is unique in its simple, rugged construction, and has many other advantages: complete control of load at all times, easy swiveling under full load, extreme range of tongue positions for short turns, extra high lift for steep ramps or high thresholds without striking skid legs.

Nutting Live Skids are sturdily built to Nutting standards of quality. They take the grief year after year! A large range of standard platform sizes, with superstructures available if desired. The Nutting Jack-Skid System is outstanding—investigate!—compare!

Nutting Makes Everything in FLOOR TRUCKS, WHEELS, CASTERS. Look in your classified phone directory for your nearest Nutting representative, or write for Bulletin 47-G direct to

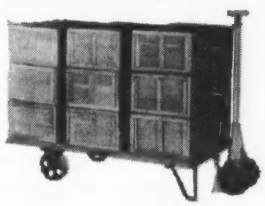


FIG. 421, Standard Industrial Skid, 9 platform sizes from 24" x 48" to 42" x 72". Capacity 1800 lbs. Metal or Rubber Tired Wheels.

FIG. 420, Heavy Duty Industrial Skid, 9 platform sizes as above. Welded angle steel frame. Capacity 2800 lbs. Metal or Rubber Tired Wheels.

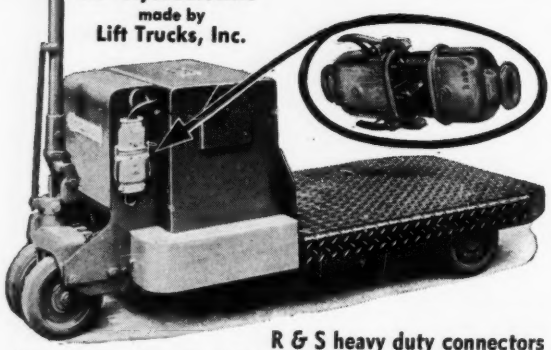
THE ONLY MECHANICAL JACK WITH NO SPRINGS

our 56th Year NUTTING TRUCK and CASTER COMPANY

1601 DIVISION STREET, FARIBAULT, MINNESOTA

R & S BATTERY CHARGING CONNECTORS

on "Hydroelectric" made by Lift Trucks, Inc.



R & S heavy duty connectors have been the standard for leading industrial truck manufacturers for more than 35 years. Self Locking battery plug shown is easily removed by hand latches. Metering connections if desired.

Many other types available. All precision-built, carefully inspected.

Since 1902

RUSSELL & STOLL COMPANY

EXPLOSION-PROOF, WATER-TIGHT AND EVER-LOK RECEPTACLES, PLUGS, CONNECTORS, SWITCHES AND FIXTURES

125 BARCLAY STREET · NEW YORK 7, N. Y.

42

ON THE PALLET . . .

(Continued from page 30)

warned that the giant Interstate Highway System programmed by the federal and state governments for the next few years should be constructed to serve the developed and expanded conditions of 50 to 75 years hence, rather than the traffic of the two immediate decades.

Dr. Worley, a faculty member of the Engineering College, University of Michigan, concluded in a two and one-half year study that large vehicles bearing heavy loads do not appreciably damage highway pavements provided the gross weight is cushioned and supported by multiple axles.

Thus, according to the paper, "all experiments and investigations made since the first road test of the Public Roads Administration in 1925 show that dual axles, each loaded to the full legal limit of a single axle, will do no more injury to the pavement than a single axle, bridges of course excepted."

"From this," Dr. Worley said, "it is reasonable to infer that 10 or 100 axles spaced 42 inches apart (the spacing favored by many authorities), and each carrying the legal load of a single axle, would not injure the pavement. This is the conclusion of some of those who have studied the subject and is recognized as correct by the Public Roads Administration." Dr. Worley also pointed at current plans for new bridges as being woefully behind the times with respect to carrying capacities.

FMC ACCORDION CONVEYOR

A better way to handle material, boxes and packages

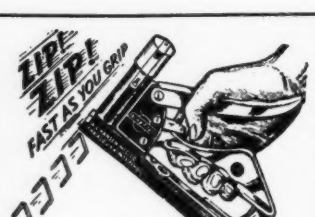
Sets up anywhere in a few minutes

Portable, extensible, collapsible and flexible, comes in as many sections as you want...will take your packages around curves or S turns... and when not in use can be folded up, ready to use again in a jiffy! In time, space and labor saving, this conveyor is a downright economy. Detailed information on FMC standard and portable conveyors on request. Address Dept. E.

FOOD MACHINERY CORPORATION

RIVERSIDE DIVISION
Riverside, California

Roller design keeps box on conveyor regardless of curves



HANSEN TACKERS

Put the Go in Flow of Shipments

GET those boxes tagged and on the go. Tag them with the speedy zip-zip staple-driving action of the Hansen one-hand automatic Tacker.

Hansen Staples for use in Hansen Tackers are made in eighty different sizes, widths and lengths—in strips for convenient use, and packed in the *Blue* Box.

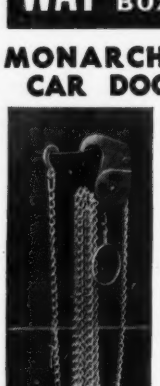
All Hansen Staples are packed in the distinctive Blue Box imprinted with the Hansen Trade-Mark as quality assurance.

A. L. Hansen Mfg. Co.

5010 Ravenswood Ave.
CHICAGO 40, ILL.

WORLD'S EASIEST WAY TO OPEN ANY BOX CAR DOOR

MONARCH ONE MAN CAR DOOR OPENER



One man can open the most binding, balky box car door with the Monarch Car Door Opener. Get greater safety . . . speed loading and unloading schedules . . . order an ample supply to fill your needs today!

• No strained muscles. No slips or falls. No broken arms, legs or mashed fingers. No fatalities. No time wasted. No "gangs" needed. No time loss.

ONLY $22.50 EACH F.O.B. Bowerston

Write for free descriptive literature.

Mining Safety Device Co.

Dept. F-2, Bowerston, O.

GOING HIGH . . .
(Continued from page 23)

the smaller racks is 4'7" and of the larger ones 6'2". The units are made of ¼" plate bent to size, and the corner posts are of course equipped with nesting pins. A recent development on the large racks is that one of the long, narrow supports is hinged. This arrangement permits this part to be flopped over, thus forming a convenient "ramp" on which the tires can be rolled into (or out of) the rack. When the tires have been loaded, the side is raised with a toggle lever.

The large racks contain a minimum of two tires; thees are tiered three high (18½' to the top of the load). The smaller racks are tiered four high, achieving a comparable height. They are so designed that the bottom of the tire will not interfere with entry of the truck forks. And, like the open-end boxes, they can also be entered crosswise as well as lengthwise by the truck forks, if necessary.

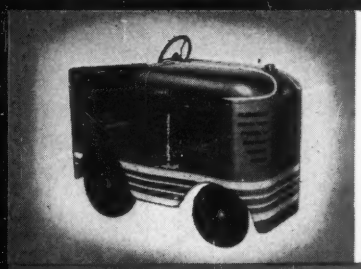
These racks have several advantages, in addition to use of vertical space.

1. Flexibility is obtained because the heavy tires can be handled in "units" either by powered truck or crane. 2. Product protection is also realized by the avoidance of stacking the costly tires flat on their sides, one on top of the other. Instead, the racks support the weight. 3. Ease of handling. This refers to the fact that the tires are stored in an upright position. They can thus be conveniently rolled when they are removed for use in the assembly line. Obviously, it is far easier to roll a 1,000-pound tire than to lift it from a horizontal to a vertical position.

Specially Designed Motor Rack

In contrast to the portable tire racks, we favored a permanent rack design for the heaviest subassemblies handled, Diesel motors, which weigh 3,000 pounds each. Prior to our present program, in our old plant these motors were stacked two high by use of wooden horses. The motor on the floor was straddled by the individual horse, which supported a second motor on top.

Cut Cost Factors with Clark Tructractors



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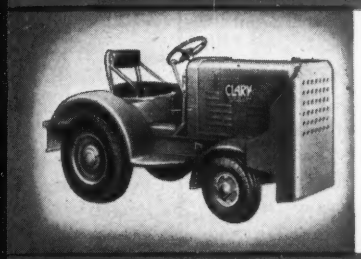

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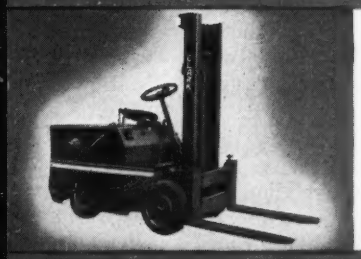

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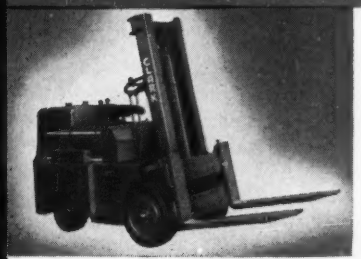

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But "two high" was too low for the headroom of the new plant. At the same time the weight of the motors indicated the need for an especially sturdy structure.

The result of our studies was the permanent motor rack, designed by our Factory Manager, George Armington, in which the motors are tiered four high (170 inches to the underside of the top shelf). The capacity of this installation is 192 motors—four wide, four high and 12 deep. The motors are shipped by the vendor in a returnable cradle with spaces for fork truck entry in the base.

Here are some details of this operation. In order to enter the rack, the truck operator must approach the structure with the load at shelf height. In removing the motors, it is not necessary to take the units in consecutive order. See the last paragraph of the "Mechanically Speaking" section. Since the oblong rack is open at both ends, it is accessible from these two points either for loading or unloading.

An important factor of the design is that the various shelves are not equally spaced in relation to each other on the vertical members—in order to provide the best possible visibility for the fork truck operator handling the heavy motors at various levels. For example, the second shelf has the least clearance, though it is of course ample, because it is at the truck operator's eye level. Accordingly, each of the two upper shelves has more clearance than the one below it. The exact spacing of the shelves, along with details of the rack construction, is given in the "Mechanically Speaking" section of this article.

Pallet Frames and Pallets

These are the other two main types of containers and load carriers adopted in our material handling program. The pallet frames measure 52″ x 36″ x 42″ and are designed for bulky and irregularly shaped parts which are too large to fit into the skid bins. Of square tubular construction, these are somewhat similar to tire racks in design, but include a deckplate. Among the items thus handled are hoods, radiator guards, fuel tanks, and frame parts. These pieces are definitely on the awkward side, particularly when handled individually by manual means. Today these otherwise hard-to-handle items are moved in quantity by fork truck and/or crane with dispatch and ease. These frames are used chiefly in our yard storage operation.

For parts adaptable to palletization, we adopted a stevedore type pallet, with a three-inch overcut, in two sizes. Thus the palletized loads can be handled either by fork truck or crane. Since our indoor storage and assembly areas are covered either by gantry or traveling bridge cranes, any of the containers described are handled intermittently by this overhead equipment.

The dimensions of our smaller pallet are 32″ x 42″. This size was decided on following a study of a large group of cartons, kegs, and small miscellaneous parts. The available space in the assembly lines was an equally important consideration. These lines are paralleled by the temporary storage strips previously mentioned, which in turn are flanked by aisles on each side. This temporary storage space is extremely valuable, and the smaller pallet size proved to be a space-saving feature. Our larger pallets (48″ x 48″) are used for such heavy items as rims, rear axle housings, tanks, and large rear axle parts. Many of these pallets are also used in our yard operation.

Special Handling Problems

It stands to reason that where parts of so many different shapes and sizes are handled as in our plant, certain pieces are bound to require special attention. One or two examples may prove illuminating.

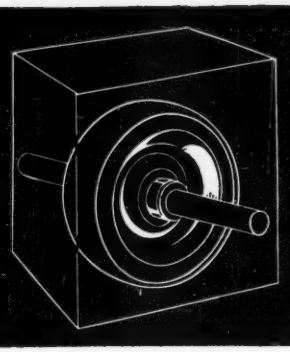
An item of special interest—because of its bulk—is the complete cab assembly, which is handled by means of a special extension on the truck forks. This extension (shown in one of the photos) consists principally of two parallel pieces of 4″ x 4″ lumber, about 10 inches apart, which are secured by bolted cross pieces. (The forks are inserted through the overhang of the cross pieces.) The vertical member at the end gives this gadget the

Mechanically Speaking

The motor rack covers an area, adjacent to the assembly lines, that is 28′ wide and 34′ deep, and the overall height of the shelf locations proper is 20′. To this must be added three feet of the reinforcing or supporting superstructure. The important dimension is the spacing between columns, 6′8″, which allows 6′0″ clear space. The shelves extend out 14″ on either side, allowing 44″ for the lift truck to move in. The vertical members are made of eight-inch I-beams bedded in concrete footings 20 inches square. The welded shelves are made of ¼″ plate, supported at the bottom by a length of the same stock to give a triangular box section. To compensate for the "open construction" (absence of support between vertical members), each shelf ledge is also reinforced with a back plate of ¼″ stock.

As mentioned in the body of the article, the vertical spacing between individual shelves on the columns varies in accordance with optimum visibility for the fork truck operator. This is an important factor, both for the truck operator and the expensive units being handled. The spacing is as follows: 1. Bottom shelf—56¼ inches. This, somewhat higher than actually necessary, allows for pieces of 4″ x 4″ lumber which are placed on the floor for dunnage. 2. Second shelf—55¼ inches, the least clearance because it is at the operator's eye level. 3. Third shelf—59½ inches. 4. Fourth Shelf (highest point above operator—64½ inches.

With this spacing, a 4,000-pound 60″ lift fork truck can travel into and unload motors from the first and second shelves without disturbing the ones on the third and fourth; and the regular 6,000-pound high-lift truck can go into and unload the lower three shelves without disturbing the top row.



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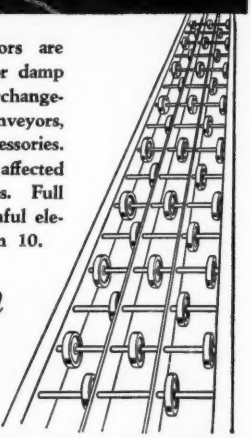

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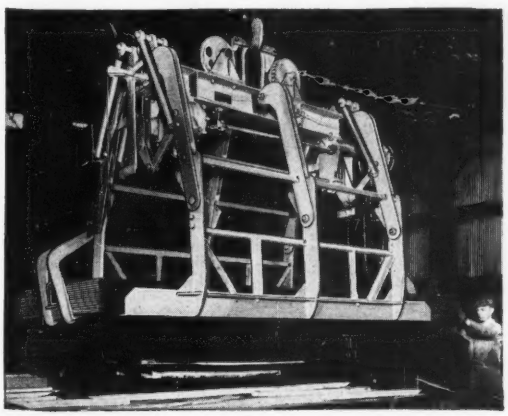

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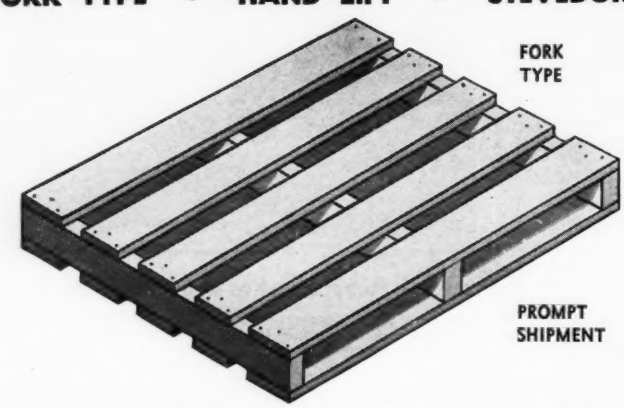

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shape of the letter "L," place on its side. After the extension has been slipped over the forks, the truck operator inserts it through the open cab window. When the lift is made, the inside of the cab roof rests on the vertical member at the extreme end of the extension, while the top of the window is supported by a cross piece at the other end. Thus the forks do not come in contact with the cab.

Another load carrier we designed is a sectioned pallet box for differentials (see photo). The four-sectioned frame, made of 2″ x 10″ lumber, is attached to 36″ x 36″ pallets. The housing flange rests on the box, as shown in one of the photos, with the gears hanging down. Thus these expensive machined parts are properly protected. These pallets, incidentally, have five stringers instead of the conventional three. The two additional stringers are located on each side so that they are under the center of the differential, providing extra support. These products weigh about 300 pounds each, and the inside dimensions of the individual box sections are 14″ x 14″. Since the large nut at the top of the differential is not subject to damage, these units can be tiered.

Modern Handling Helps Meet Postwar Product Demand

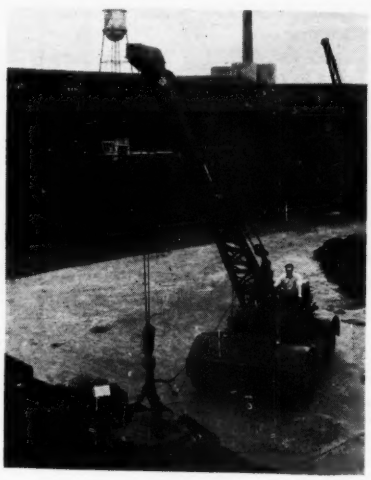
Thus we built our program from scratch, adapting standard material handling equipment wherever possible and developing special ideas where necessary. In many cases, ideas were proposed by the men working directly on material handling. We were also fortunate in the fact that the management of the Euclid Road Machinery Co. has been exceptionally receptive to the improvement as well as cooperative in its execution.

Today, after years of world-wide destruction, there is a greater need than ever for the earthmoving tools of construction. Our management realizes the dependence of production on efficient material handling operations, and thus our new program is a direct aid in helping us meet the greater postwar demand for the equipment we produce.

VERSATILE MOBILE CRANE

HERE are two views of a mobile industrial crane currently in use at a large mid-western plant. In the upper photo, the equipment is shown picking up a castered bin of process parts for movement into the plant, where its size enables

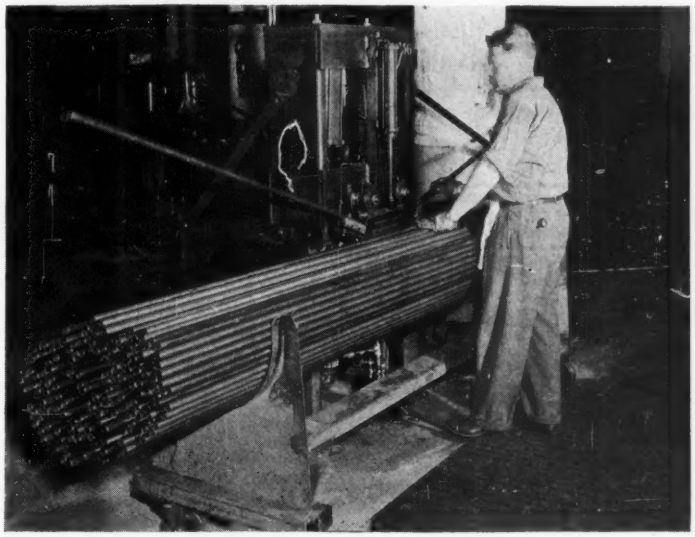
it to operate through factory aisles. The lower photo shows the versatile rig with an electro-magnet attached for use in moving large quantities of steel scrap, turnings, castings, etc. A 180-degree working arc eliminates unnecessary



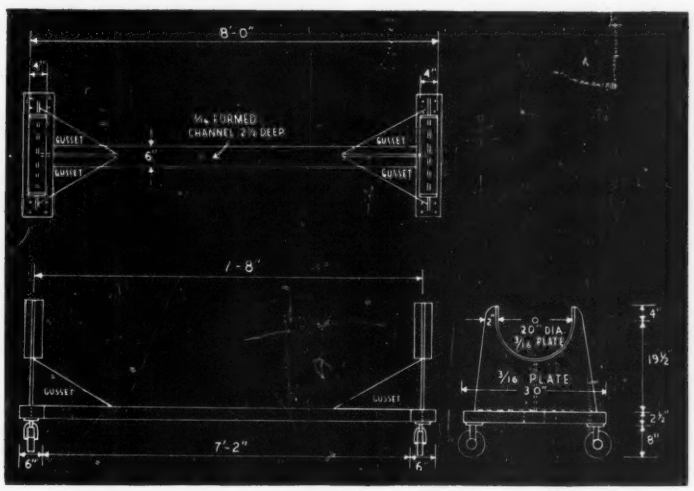
turning and thus reduces operational costs. Like the magnet, a clam shell for handling bulk material is quickly attached or detached. Unloading of gondola or flat cars is likewise readily handled with the extra long boom—*Courtesy, Hughes-Keenan Co.*

CRADLE TRUCK FOR TUBES

THE company using this type of truck produces tubular furniture frames at such a rapid pace that stock handling methods required special attention. Use of the truck shown is now aiding in maintaining production at a high level.



Tube bending in large-lot production requires that a constant supply be on hand. Temporary storage on the floor or on racks adjacent to the processing area is one way of handling these long pieces. This photo shows another way.



The specially designed cradle truck holds 250 tubes which are approximately 15 feet long and weigh about 3,400 pounds. The cradle design keeps the tubes in place and yet permits easy removal from the pile.

The four swivel casters allow the truck to be moved between stations with minimum effort, and the height gives short positioning distance into the machine. The accompanying drawings illustrate the arrangement and dimensions of the assembly and component parts.—Courtesy, Parker Appliance Co., Cleveland.

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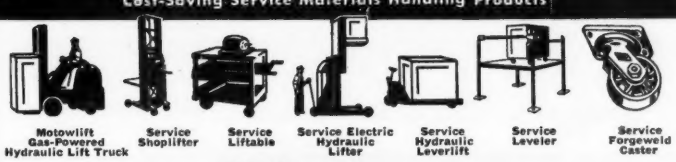

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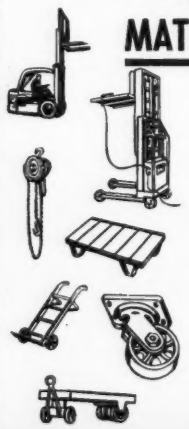

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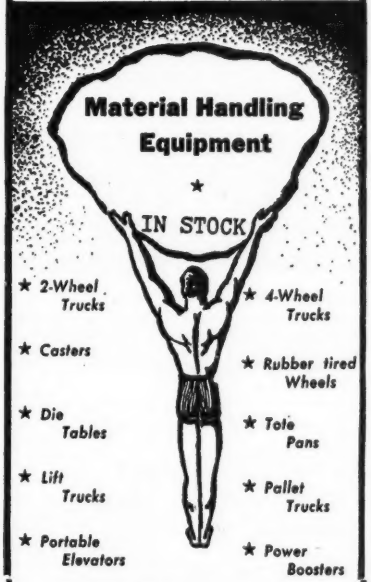

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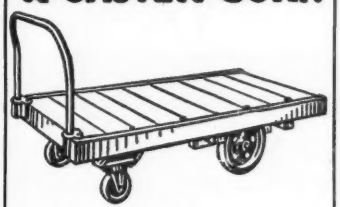

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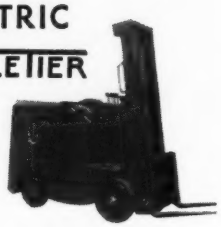

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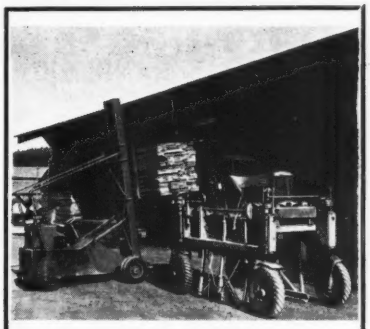

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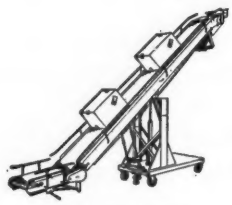
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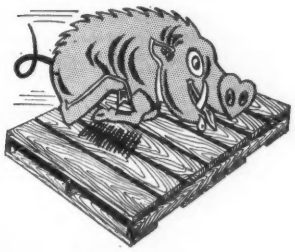

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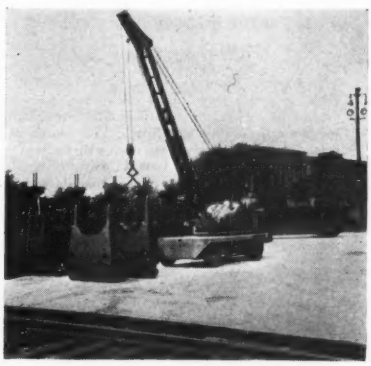
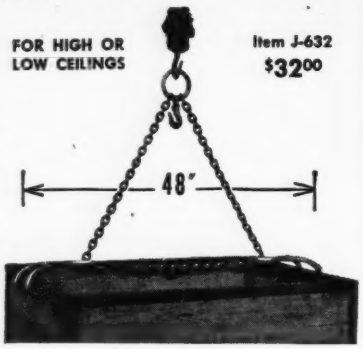
In concreted yard storage areas without depressed truck docks, this crane truck is facilitating both receiving and outside storing operations. The heavy



subassemblies being handled from the highway vehicle, incidentally, are front winch attachments for crawler tractors and weigh approximately 2,800 pounds apiece. In this particular operation the machine is using a special "ice tongs" type grab, which is attached through a hole in each of the two upright members of the winch attachment. The crane truck is used for handling many types of heavy parts throughout the large yard areas, as well as for unloading gondolas and flat cars.—Courtesy, International Harvester Co., Industrial Power Division, Tractor Works.



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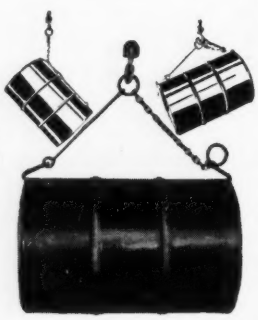
For picking up all types of heavy boxes, crates, bales or other loads where hooks may be used.

Made of heavy forged steel hooks with an adjustable spread which provides for handling of every size load from 16" to 48". Sturdy ⅜" BBB chains. Capacity 2000 lbs.

The heavier the load the tighter the grip. Let the "Universal Grab" do your heavy lifting, avoid accidents to your employees.



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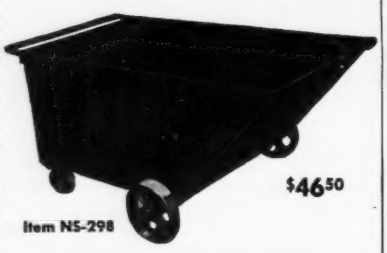
Will handle drum for draining purposes. Can pick up drum from lying position and set on end. Use for loading on or unloading truck and for general purpose handling. Will handle barrels, drums, kegs, anything with a lip such as on steel drum or wooden barrel. Simple in construction . . . easy to operate . . . heavily welded chain, forged grab hooks. Weight 8½ lbs. Air dry enamel finish.



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Constructed of heavy sheet steel, reinforced with band at top edge, stout ⅝" round rod iron handle welded to truck. This truck measures 25¾" by 45" at the top and 25¾" by 27" at the bottom by 17½" deep—carries about ½ cu. yd. and weighs 125 lbs. Equipped with two 8" semi-steel wheels and two 4" metal swivel casters. Air dry enamel finish.

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A general utility push truck, "Tilt Type" for easy wheeling and short turning of corners. Built of all hard wood, completely metal bound, all welded construction, no bolts used. Two rigid and two swivel, 5" metal casters, ½" tilt. Metal parts air dry enamel finish, wood left natural.

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Box measures 28" wide, 48" long, 30" high, weight 260 lbs.

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With Safety Knuckle Guards

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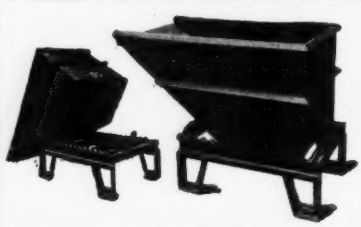

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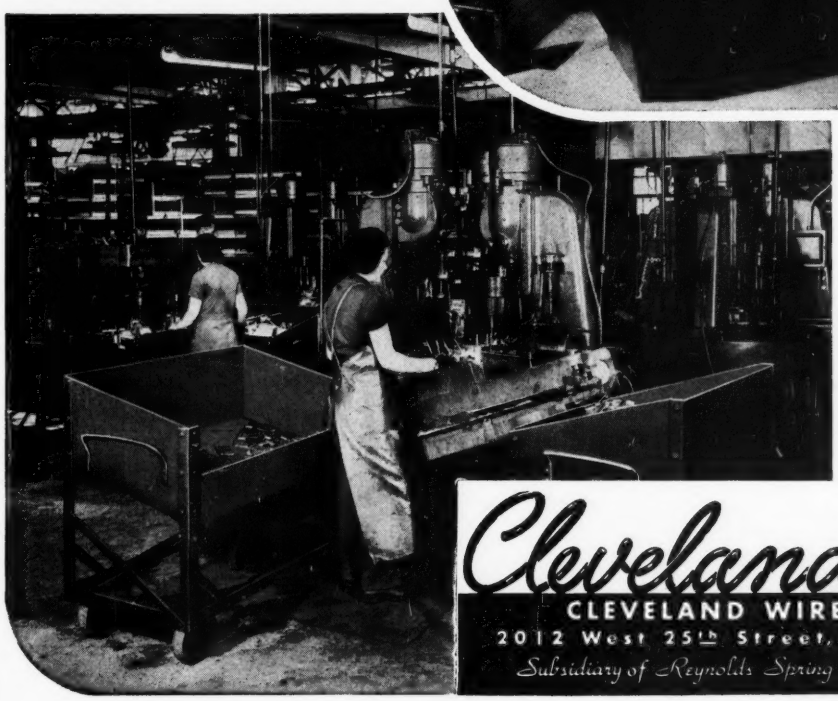
CLEVELAND WIRE SPRING COMPANY

ORIGINAL IDEAS!

Replacing boxes of more conventional type the Soss Mfg. Co., Detroit, uses a smaller number of relatively large capacity box trucks for most efficient handling of small products, (hinges) as here illustrated. Much time is saved by elimination of repeated pickups with separate truck and restacking. Where, as in this plant, successive operations are numerous, calling for frequent moves between machines or departments in close proximity, this idea has many advantages.



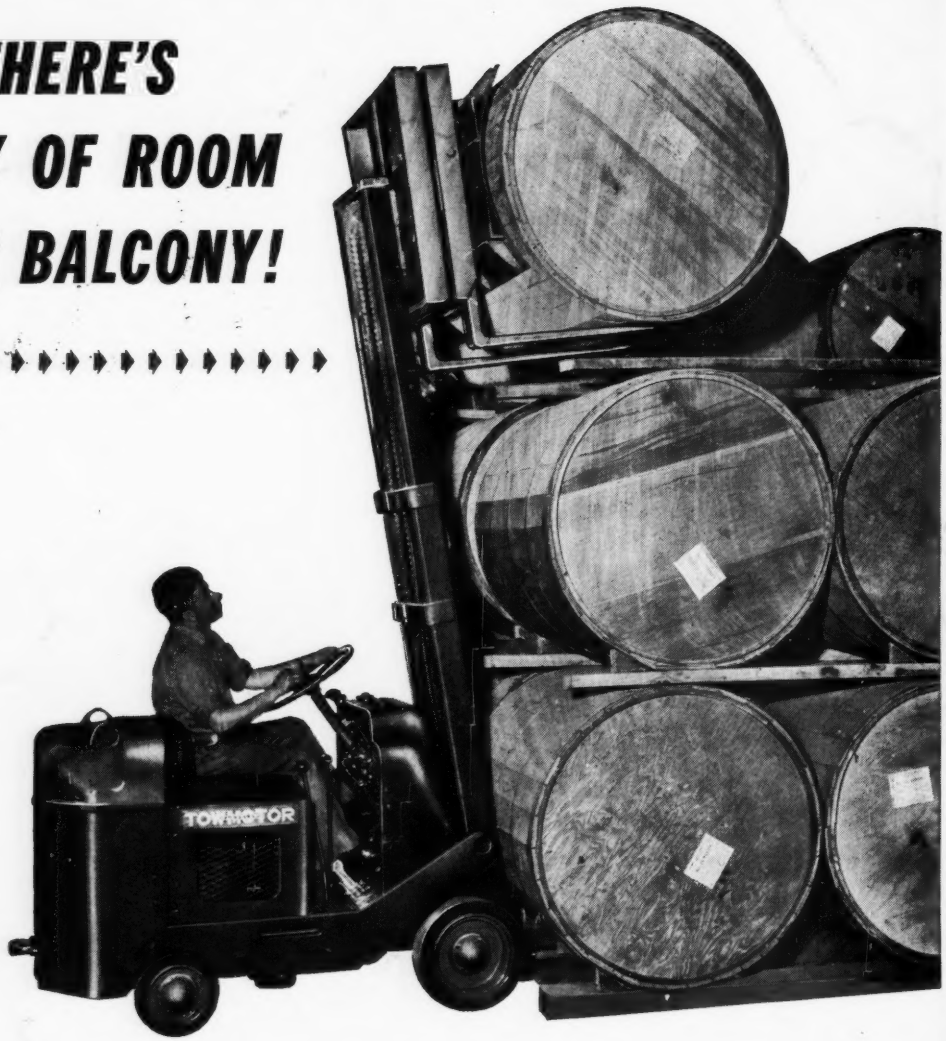
ASK FOR CATALOG

of "Cleveland" steel shop boxes, barrels, stools, hand trucks, tool boxes and cabinets, racks, bins, etc. Contains many valuable suggestions.

Cleveland **STEEL SHOP EQUIPMENT**

CLEVELAND WIRE SPRING CO.
2012 West 25th Street, Cleveland 13, Ohio
Subsidiary of Reynolds Spring Company, Jackson, Mich.

THERE'S PLENTY OF ROOM IN THE BALCONY!



"Main floor" storage is expensive — especially when overhead storage space is wasted. In many operations, outmoded handling methods prevent full utilization of the existing storage area. In many other operations, Towmotor Fork Lift Trucks have doubled, even tripled, storage capacity through high stacking of materials and products.

Let Towmotor show you how to "pack the house," convert waste space into profitable warehouse space. First step? Send for a Pocket Catalog describing the complete line of Towmotor Fork Lift Trucks and Accessories.

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TOWMOTOR FORK LIFT TRUCKS *and* TRACTORS

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